SPECIAL PROVISIONS
IPSWICH
Bridge Replacement Br. No. I-01-007 (Steel)
Route 1A (High Street) over the MBTA & B&M Railroads

Labor participation goals for this project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both contractor's and subcontractor's on-site construction workforce. Refer to document 00820 for details.

SCOPE OF WORK

The work under this Contract shall be to replace the existing bridge structure carrying Route 1A and Route 133 (High Street) over MBTA & B&M Railroads at the same location and to reconstruct a portion of each approach.

The work shall include construction of a temporary pedestrian bridge, demolition of the existing bridge superstructure in its entirety, partial demolition of the bridge substructure and disposal of the debris. Work includes the construction of a new three-span continuous steel beam superstructure supported on stub abutments and two seven-column piers. It also includes the reconstruction of the approach roadways, drainage and pavement works and landscaping as shown on the Plans. The work under this Contract shall be completed in four stages.

The work includes, but is not limited to, the following:

- Installation of temporary pedestrian bridge
- Installation of temporary protective screening;
- Installation of temporary steel shielding;
- Demolition and removal of the bridge superstructure;
- Partial demolition of the existing concrete abutments, piers and wingwalls;
- Construction of proposed abutments, piers, crash wall, wingwalls and retaining walls;
- Installation of steel rolled beams;
- Construction of 200 mm HP cement concrete deck slab;
- Construction of approach slabs;
- Construction of HP cement concrete sidewalk, CP-PL2 bridge barrier and guardrail transitions;
- Installation of Type II protective screen and handrail on the barriers;
- Placement of a membrane waterproofing system and hot mix asphalt wearing surface;
- Removal of temporary protective screening;
- Demolition and removal of a temporary pedestrian bridge.

SCOPE OF WORK (Continued):

The roadwork included in this project will consist of installing new drain lines and structures; resetting existing curb; installing new granite curb; constructing cement concrete sidewalks; installing guardrail; removing and resetting signs; paving; furnishing and installing pavement markings; and other incidental items of work listed in the proposal.

All work done under this contract shall be in conformance with the Massachusetts Highway Department 1995 *Metric Edition Standard Specifications for Highways and Bridges* and the *Metric Supplemental Specifications* dated June 6, 2006; the *Standard Special Provisions* contained in this book, the *1996 Construction and Traffic Standard Details* and the *Supplemental Drawings* dated April 2003; the latest edition of the *Manual on Uniform Traffic Control Devices* with revisions; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; the latest edition of *American Standard for Nursery Stock*; the Plans and these Special Provisions.

MASSHIGHWAY TO MASSDOT NAME CHANGE

The following definitions in Section 100 of the Standard Specifications for Highways and Bridges are revised as follows:

(Amend definition of Department)

1.17 –Department .....Effective November 1, 2009, St. 2009, c. 25 abolishes the Massachusetts Department of Highways and all assets, liabilities, and obligations become those of the Massachusetts Department of Transportation ("MassDOT). Anywhere in this contract the terms Commission, Commonwealth, Department of Public Works, Department, Massachusetts Highway Department, MassHighway, Party of the First Part, or any other term intending to mean the former Massachusetts Department of Highways is used, it shall be interpreted to mean MassDOT or applicable employee of MassDOT unless the context clearly requires otherwise. Furthermore, MassDOT by operation of law inherited all rights and obligations pursuant to any contract, and therefore parties to this contract hereby acknowledge and agree that its terms shall be liberally construed and interpreted to maintain the rights and obligations of MassDOT. Furthermore, the parties hereby acknowledge and agree that the transfer of all rights and obligations from the Massachusetts Department of Highways to MassDOT shall not have the effect of altering or eliminating any provision of this contract in a manner that inures to the detriment of MassDOT.

(Add a definition for MassDOT)

1.46 – MassDOT..... The Massachusetts Department of Transportation, a body politic and corporate, under St. 2009, c. 25 "An Act Modernizing the Transportation Systems of the Commonwealth", as amended.

CONTRACTOR QUESTIONS

Contractors are required to submit all questions to the Construction Contracts Engineer by 1:00 P.M. on the Thursday before the scheduled bid opening date. Any questions received after this will not be considered for review by MassHighway.

EMAIL ADDRESS FOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Contractors should email questions and addendum acknowledgements to the following email address mhd-specifications@mhd.state.ma.us. In the email title it is requested that the MHD project file number and municipality be included for identification purposes.

CONTACTS:

MassDOT-Highway PROJECT MANAGER - Mr. Matthew Hopkinson, 617-973-8193
DESIGNER - K&M Associates,781-396-9747

INSURANCE REQUIREMENTS

The insurance requirements set forth in this section are in addition to the requirements of the Standard Specifications and supercede all other requirements .

Railroad Protective Liability Insurance and Protective Property Damage Liability Insurance shall be obtained in the amount of $2,000,000. / $6,000,000., on behalf of MBTA. See MBTA specifications enclosed.

PRECONSTRUCTION CONFERENCE:

Under Item No. 100.01 SCHEDULE OF OPERATIONS - FIXED PRICE $100,000.00, the Baseline Construction Contract Schedule as "Resubmittal Not Required" (As-Planned Schedule) shall be presented at the Pre-Construction Conference. No work shall be started prior to Engineer's approval of the Baseline Construction Contract Schedule.

VALUE ENGINEERING INCENTIVE

A. This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals (VECPs) which are initiated, developed and submitted by the Contractor under the Department's Construction Phase Value Engineering (VE) Program to change the Drawings, Specifications or other requirements of the Contract. The purpose of the VECP Program is to encourage the Contractor to submit proposed changes to the requirements specified in the Accelerated Bridge Program contract documents, based on the Contractor's experience and knowledge of alternative, cost-reducing and/or time saving, means, methods, materials and technologies.

Value Engineering is the systematic application of recognized techniques which identify the function of a product or service, establish a value for that function, and provides the necessary function reliability at the lowest practical lifecycle cost.

VECPs submitted under the Contract shall require a change to the Drawings, Specifications or other requirements of the Contract Documents. As defined in Subsection D below, the incentive to the Contractor provided under this Subsection is to share the net savings resulting from acceptance of a VECP on the basis of fifty (50) percent for the Contractor and fifty (50) percent for the Department. In order to be considered for acceptance under this Subsection, each VECP shall:

1. Be identified by the Contractor at the time for submittal to the Engineer as submitted pursuant to this Subsection;
2. Yield a net savings in the cost of the instant Contract, as defined below, in excess of $100,000 One Hundred Thousand dollars;
3. Maintain the specified items' required functions such a s service life, reliability, economy of operation, ease of maintenance, and necessary standardized features and appearance; and
4. Shall not require an unacceptable extension of Contract Times or Contract Milestones.

VALUE ENGINEERING INCENTIVE (Continued):

B. Any VECP the Contractor submits shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide material of the type, detail and in a format acceptable to the Engineer, and necessary to facilitate the Engineer's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP concepts; including no response(s) from the Department.

Initial information provided by the Contractor shall include:

1. A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;
2. Contract requirements recommended to be changed if the proposal is accepted;
3. Any changes in the Contract Time(s) or Contract Milestone(s) that will result from acceptance of the proposal accompanied by a contemporaneous schedule analysis;
4. A statement of the time by which the proposal must be accepted so as to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s).
5. A detailed estimate of the anticipated net savings will be calculated **as** follows:
    a. Calculate the cost of performing the construction activities in accordance with the contract documents as bid.
    b. Calculate the cost of performing the construction activities associated with the VECP.
    c. Estimate the costs of the Contractor required engineering, and the costs for the Designer of Record, to implement the proposed VECP. The Contractor will be responsible to contract with the State's Designer of Record for all review time necessary to amend and approve the original design."
    d. Estimate the Department's costs to perform engineering reviews and administer the VECP.
    e. Estimate all costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions.
    f. The net savings to be split between the Department and the Contractor shall be calculated as follows:
    a - (b+c+d+e) = net savings
6. The VECP shall be stamped by a professional engineer.

VALUE ENGINEERING INCENTIVE (Continued):

C. The Engineer may accept or reject part or all of any VECP by giving the Contractor. Approval of the VECP does not occur until a modification incorporating the VECP is issued by the Department and the Contractor re-certifies that to the current status of the originally proposed cost and/or schedule savings, to be provided within 5 days of the receipt of the Departments approval letter. Until such notice is issued, the Contractor shall remain obligated to perform the Work in accordance with the terms of the Contract Documents. VECPs will be processed expeditiously; however, the Department shall not be liable for any delay in acting upon any proposal submitted pursuant to this Subsection. The decision of the Engineer as to acceptance of any such proposal shall be final and shall not be subject to the dispute resolution.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by the Engineer. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time from the date of submittal that each VECP shall remain valid. Revision of this validity period shall be allowed only by mutual agreement of the Contractor and the Engineer.

If the Contractor desires to withdraw the proposal prior to the expiration of this period, it shall be liable for the costs incurred by the Department in reviewing the proposal. If the Contractor withdraws the VEC Proposal, the Department reserves the right to proceed with the VECP or any portion of the VECP as a normal change and *the* Contractor waives any right it may have had to share in net savings hereunder. For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if the Department requests an extension of that time and the Contractor does not provide a written extension.

VALUE ENGINEERING INCENTIVE (Continued):

D. Prior to the VECP's final accepted by the Engineer, the Contractor shall provide a:

1. A Change Order, covering an Equitable Adjustment in the Contract Price and in any other affected provisions of the Contract, shall be issued and the draft Contract changes shall be detailed in accordance with the provisions in these General Requirements.
2. The delineation of the shared net savings shall be determined by deducting from the estimated gross savings:

a. The Contractor's documented costs expended for developing the proposal for the accepted VECP;

As part of the final agreement of the shared savings, the Department will also provide an estimate of the additional costs incurred by processing and accepting ***the*** VECP which includes all anticipated increased costs to the Department on other Contracts and all anticipated follow-on increased costs to the Department, if any.

When a VECP submitted pursuant to this section is accepted by the Engineer, compensation shall be based on the following:

1. The VECP will be implemented and paid using the cost and resource loaded schedule as the final negotiated costs to implement the VECP.

WORK WITHIN RAILROAD RIGHT OF WAY

All personnel working within the railroad property must pass the Right of Way Safety Course of Massachusetts Bay Commuter Railroad Company (MBCR).

PROSECUTION OF WORK AND PROVISIONS FOR TRAVEL :

The Contractor shall not close the bridge to traffic until the following minimum criteria have been met:

- All shop drawings required for the new bridge structure, including the bridge demolition and erection procedures, have been approved.
- The temporary water main is in place and operational.
- All construction and detour signing has been installed as noted on the Plans and approved in the field by the Engineer.
- All barriers and temporary fencing as noted on the Plans have been delivered to the site.
- Final approval of the bridge closure setup has been authorized in the field by the Engineer.

The Contractor shall notify the Engineer in writing two weeks in advance of any proposed short-term temporary roadway closures necessary to complete the work.

DISPOSAL OF EXCESS MATERIAL

Surplus materials obtained from any type of excavation, and all existing and other materials not required to be removed and stacked or needed for use on the project, as determined by the Engineer, shall become the property of the Contractor and disposed of subject to the regulations and requirements of local authorities governing the disposal of such materials, at no additional compensation.

ENVIRONMENTAL PERMITTING:

If erection, demolition, storage, or other procedures planned or executed by the Contractor violate environmental requirements as determined by the Engineer, no associated work can occur until all required environmental permits have been obtained allowing such work. The Contractor must notify the Engineer in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated through the Engineer. The Contractor shall fully cooperate with requests for information and provide same in a timely manner. The Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

PROVISIONS FOR TRAVEL AND PROSECUTION OF WORK

The work schedule shall include a plan of his construction procedures, and the safety measures he will use during the prosecution of the work as set forth in Section 850 of the Standard Specifications for Highways and Bridges. The Contractor shall provide monthly updates of the Construction Schedule Bar Chart to the Engineer.

The Contractor may be required to temporarily suspend operations when such are considered by the Engineer, to be a hazard to traffic.

The castings of all structures, which are required to be set or reset under the pertinent items of this Contract or by others shall not be set complete in place to the established grade until after the bituminous concrete binder course has been completed in place as directed.

NOTICE OF OWNERS OF UTILITIES

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer.

Following is a list of Utility Companies and others who may be involved in this project but the completeness of the list is not guaranteed:

Dept. of Public Works
25 Green Street
Ipswich, MA 01938
Robert Gravino
Tel: (978) 356-6612

Ipswich Municipal Light Department
P.O. Box 151
272 High Street
Ipswich, MA 01938
Tim Henry
Tel: (978) 356-6635

Fire Alarm
55 Central Street
Ipswich, MA 01938
Will Maker
Tel: (978) 356-4321

Fire Department
55 Central Street
Ipswich, MA 01938
Chief Arthur Howe III
Tel: (978) 356-6627

Police Department
15 Elm Street
Ipswich, MA 01938
Tel: (978) 356-4343

M.B.T.A. Permits
Patricia Barrett
Tel. (617) 484-2525

Verizon
1166 Shawmut Avenue
New Bedford, MA 02746
Karen Nunes
Tel: (508) 991-3522

National Grid Gas
40 Sylvan Road
Waltham, MA 02451
Dennis Peri
Tel: (781) 907-2836

Lightower Fiber Networks
80 Central Street
Boxborough, MA 01719
Robert Powers
Tel.(978) 264-6020

Comcast
676 Island Pond Road
Manchester, NH 03109
Stacey Charest
Tel: (603) 628-3732

MBTA
32 Cobble Hill Road
Somerville, MA 02145
Paul Jordan
Tel. (617) 222-5439
M.B.C.R – Railroad Safety Training
James Merrill
Tel. (617) 222-3614

PROTECTION OF UNDERGROUND FACILITIES

The Contractor's attention is directed to the necessity of making his own investigation in order to assure that no damage to existing structures, drainage lines, and other utilities will occur as a result of his operations.

The Contractor shall notify "Mass. DIG SAFE" call center: Telephone 1-888-344-7233 and procure a DIG SAFE number for each location prior to disturbing existing ground in any way.

PAINTING (STRUCTURAL) CERTIFICATION

All Contractors and Subcontractors performing lead-based paint removal, containment and collection, surface preparation and coating of structural steel must be prequalified by MassHighway in the Painting (Structural) category.

PERSONAL PROTECTIVE SAFETY EQUIPMENT FOR CONSTRUCTOR PERSONNEL

The Contractor is responsible to ensure that all personnel, including all subcontractors, working on the project are issued and are wearing all necessary personal protective safety equipment while working within the project limits. This equipment shall include, as a minimum, a hardhat and a safety vest, regardless of the type of work being performed. Other safety equipment shall be added as required to perform the work in which they are engaged and in accordance with all local, state and federal requirements in effect. Safety equipment shall be provided at no additional cost to the Massachusetts Highway Department.

STRUCTURE DEMOLITION

The contractor will make his own investigation of the structure to be demolished including the materials that are part of, or may be stored in the structure. No increases will be made to the bid price due to the nature of the materials involved in the demolition. All costs for permits, dump fees, taxes, special handling, etc. of hazardous materials shall be included in the bid price of the demolition item.

GENERAL REQUIREMENTS FOR WORK INVOLVING PAINTED STEEL

(1/21/2009)
Demolition and work involving painted steel shall conform to the requirement of Section 961 of the Supplemental Specifications dated June 6, 2006.

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead, unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Cutting or Burning of Steel

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

Lead paint shall be removed in its entirety in an area prescribed by a 15 cm (6 inches) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Section 961.67 “Containment”. Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

GENERAL REQUIREMENTS FOR WORK INVOLVING PAINTED STEEL (Continued):

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly of Steel
All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30ug/cm.

For purposes of limiting the lead dust, the Contractor shall dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

Environmental
All applicable portions of Sections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work. During chemical stripping a hand washing facility maybe used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Section 961.68 “Handling of Hazardous Waste and Reporting Release Programs”. Submittals shall be according to Section 961.69 “Submittals”.

ARCHITECTURAL ACCESS BOARD TOLERANCES

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA rules, regulations and standards.

All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR - Rules and Regulations of the Architectural Access Board (AAB). The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimensions less than the minimum dimensions.

Contractors shall establish grade elevations at all wheelchair ramp locations and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans).

All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked and checked prior to placing cement concrete. All grade changes are to be made at joints.

SECTION 3.00 – AWARD AND EXECUTION OF THE CONTRACT

3.041 Certification of Construction Equipment Standard Compliance Requirement

1. PURPOSE

The Massachusetts Highway Department (MassHighway) is a participant in the MassCleanDiesel Program established by the Massachusetts Department of Environmental Protection (DEP) and the purpose of this specification is to achieve documentable diesel emission reductions that result in beneficial air quality improvements to construction workers and the general public through the retrofit of diesel-powered non-road construction equipment.

2. CERTIFICATION BY CONTRACTOR

The Contractor shall certify that all Contractor and Sub-Contractor diesel-powered non-road construction equipment and vehicles greater than 50 brake horsepower (hp) that will be utilized in performance of the work under this contract (hereinafter "Diesel Construction Equipment" or "DCE") have (1) engines that meet the EPA particulate matter (PM) Tier emission standards in effect for non-road diesel engines for the applicable engine power group or, (2) emission control technology verified by EPA or the California Air Resources Board (CARB) for use with "non-road engines" or (3) emission control technology verified by EPA or CARB for use with "on-road engines" provided that such equipment is operated with diesel fuel that has no more than 15 parts per million (ppm) sulfur content (i.e., Ultra Low Sulfur Diesel (ULSD) fuel) or (4) emission control technology certified by manufacturers to meet or exceed emission reductions provided by either "on-road" or "non-road" emission control technology verified by EPA or CARB. Emission control devices, such as oxidation catalysts or particulate filters, shall be installed on the exhaust system side of the diesel combustion engine equipment. The Contractor is responsible to insure that the emissions control technology is operated, maintained, and serviced as recommended by the manufacturer. Note: See Section 3 regarding the use of rental equipment. See Section 5 regarding minimum emission reductions that must be provided by non-verified EPA or CARB emission control devices.

For the latest up-to-date list of EPA-verified technologies, see:
http://www.epa.gov/otaq/retrofit/verif-list.htm.

For the latest up-to-date list of CARB verified technologies, see:
http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm.

The Certification of Construction Equipment Standard Compliance Form shall be completed by the Contractor at the time of Award and shall be delivered to MassHighway within 14 days after the date of award. A copy of the Certification is included at the end of this Section for informational purposes. The Form to be completed is available for download under the MHD Business Center section of the MassHighway website: www.mhd.state.ma.us.

SECTION 3.00 (continued)

Should the successful bidder fail to execute the said form, MassHighway may, at its option, determine the Contractor has abandoned the Contract and shall take action in accordance with the Standard Specifications for Highways and Bridges, Subsection 3.06 – Failure to Execute Contract.

3. EXEMPTIONS

A. Rented diesel equipment greater than 50 brake hp that will be used on site for 30 days or less over the life of the project (i.e., 30 days cumulative) are exempt from this specification. However, if the rented equipment will be used more than 30 cumulative days, then the equipment must comply with this specification. In either case, rental equipment must be included as part of the detailed records of DCE under Section 4C. Note: Any contractor owned equipment that are more than 50 brake hp that are used on site for 30 cumulative days or less over the life of the project, are not exempt from complying with this specification.

B. Large cranes (such as Sky cranes or Link Belt cranes) which are responsible for critical lift operations are exempt from installing Retrofit Emission Control Devices if they adversely affect equipment operation. Technical justification must be submitted to the Engineer for approval to document the impact on operations.

C. The Engineer may create an exemption when there is a compelling emergency need to use diesel vehicles or engines that do not meet the contract conditions for emission controls. Examples include the need for rescue vehicles or other equipment to prevent or remedy harm to human beings or additional equipment required to address a catastrophic emergency such as structure collapse or imminent collapse. Once the emergency is controlled, such non-compliant equipment must be removed from the project. Meeting contract deadlines will not be considered a compelling emergency.

D. Diesel-powered non-road construction equipment greater than 50 brake horsepower need not be equipped with either EPA of CARB verified emission control technology if the non-road construction equipment diesel engine is certified to meet the EPA particulate matter (PM) Tier emission standards in effect for non-road diesel engines for the applicable engine power group. Note: If emissions from the DCE at the start of the project meets the most current EPA PM emissions standards in effect at the time, but are superseded by newer Tier emission standards (i.e., Tier 3 emission standards replaced by Tier 4 emission standards), then the superseded DCE must be retrofitted prior to the end of the contract with emission control technology per Section 2.

SECTION 3.00 (continued)

E. If an additional DCE (greater than 50 brake hp), or permanent replacement is brought on site after work has commenced, the Contractor has 15 calendar days from the time the DCE is brought on site, to install emission control technology per Section 2 of this specification (unless the DCE has an engine that meets the EPA particulate matter (PM) Tier emission standards in effect for non-road diesel engines for the applicable engine power group).

4. SUBMITTALS AND REPORTING

A. The Contractor shall submit a certified list of all DCE to be utilized on the project and provide the following information for each DCE in tabular form. A standardized form is available for download under the MHD Business Center section of the MassHighway website: www.mhd.state.ma.us.

Contractor/subcontractor name.
Equipment type.
Equipment make.
Equipment model.
VIN.
Engineer model Engine year of manufacture.
Engine HP rating.
Emission Control Device (ECD) type (DOC or DPF).
ECD make.
ECD model.
ECD manufacturer.
ECD EPA/CARB Verification Number or ECD performance certification provided by manufacturer(s) that the DOC or DPF meets or exceeds emission reductions when compared to an EPA or CARB verified device.
ECD installation date.
Type of fuel to be used.
Identify if owned/rented equipment.

B. For each piece of DCE, the Contractor shall also submit digital color pictures showing the machine and the MHD-issued compliance label (with inspection tag number).

C. The Contractor and subcontractor shall maintain detailed records of all DCE used on the project, including the duration times the DCE is used on the project site. Records shall be available for inspection by MassHighway. The engineer shall be immediately notified of any new DCE brought onto the project.

SECTION 3.00 (continued)

5. COMPLIANCE

A. All DCE that are not exempt under Section 3 of this specification, must comply with these provisions whenever they are present on the project site. If a non-verified EPA or CARB emissions control device is used for compliance with this specification, then the device must provide the following minimum emission reductions:

Diesel Oxidation Catalysts
Particulate Matter: 20%
Carbon Monoxide: 40%
Volatile Organic Compounds: 50%

Diesel Particulate Filters
Particulate Matter: 85%

Note: If emission reductions for a non-verified ECD appear to be questionable as determined by MassHighway, the Contractor shall provide all supporting emission test data, including test procedures, as requested by MassHighway for the ECD. If emission reductions cannot be substantiated by supporting test data, then the ECD in question must be replaced with a different ECD.

B. Upon confirming that the Diesel Construction Equipment meets the EPA particulate matter (PM) Tier emission standards in effect for non-road diesel engines for the applicable engine power group or has the requisite pollution control technology installed, MassHighway will issue a non-transferable compliance label that will assign a compliance tracking number to the DCE.

C. All DCE subject to this Specification shall display the compliance label in a visible location.

D. When leased or rented equipment which has been retrofitted by the Contractor is returned to the rental company, the Contractor will remove the Compliance label and return the label to the Engineer.

E. Use of a DCE which has been issued a compliance label and which is found without the device is a breach of this contract and will be subject to a stipulated penalty of $2,500.

SECTION 3.00 (continued)

F. If an emission control device which was purchased and/or utilized on or after March 1, 2005 and was in compliance with the MassHighway diesel retrofit requirements in place between March 1, 2005 and the issuance of this specification, the retrofit device will be considered in compliance with this specification. Note: If a retrofit device (i.e., DOC or DPF) used between March 1, 2005 and issuance of this specification does not have a performance certificate which shows the pollutant emission reductions being provided by the retrofit device meets or exceeds emission reductions provided by either an EPA or CARB verified "on-road" or "non-road" emission control device, then the device will be considered non compliant with this specification.

6. NON-COMPLIANCE

All DCE may be inspected by the Engineer or designated agent without prior notice to the Contractor. If any DCE is found to be in non-compliance, the Contractor must either remove the DCE from the project or retrofit it within 15 calendar days. Failure to comply will subject the Contractor to an Environmental Deficiency Deduction described below. A Notice of Non-Compliance will be issued by the Engineer or his agent at the time the noncompliance is identified.

If the Contractor fails to take corrective action in accordance with the Notice, within 15 calendar days of issuance of the Notice of Non-Compliance, a daily monetary deduction will be imposed for each calendar day the deficiency continue. The deduction shall be $2,500 per day for each piece of DCE determined to be in non-compliance. In addition, to the Deficiency Deduction, pay estimates will be held and no payments made until all equipment is brought into compliance. The Deficiency Deduction is irrevocable and shall not be reimbursed.

7. COSTS AND SCHEDULE

All costs associated with the installation of emission control technology are the responsibility of the Contractor and shall be considered incidental to the cost of the project. No additional compensation is provided. In addition, unless otherwise stated in this specification, all DCE greater than 50 brake hp shall comply with the requirements of this specification at the start of work commencing on site. The Contractor's compliance with this specification shall not be grounds for claims.

SECTION 3.00 (continued)

8. SAMPLE CERTIFICATION FORM

This form in this proposal pamphlet is not to be filled out by the Contractor. See Section 2, above, for information on downloading and submitting requirements for this Form.

CERTIFICATION OF CONSTRUCTION EQUIPMENT STANDARD COMPLIANCE FORM

I, _____authorized signatory for _____ _____whose principal place of business is at _____ do hereby certify that any and all large non-road (greater than 50 brake horsepower) diesel construction equipment (DCE) to be used in this contract meets the EPA particulate matter (PM) Tier emission standards in effect for non-road diesel engines for the applicable engine power group or has emission control devices such as, oxidation catalysts or particulate filters, installed on the exhaust system side of the diesel combustion engine equipment. Said equipment or devices meet the requirements of this specification.

I am submitting on behalf of _____ a list of said diesel construction equipment, labeled "Diesel Retrofit Data" that will be used in connection with this contract. The said list includes, but is not limited to the number of vehicles subject to this certification and the number of vehicles retrofitted by vehicle type. The said list shall also be signed, certifying that the information is correct and accurate as of the date of signature and is signed under pains and penalty of perjury.

I acknowledge that this certificate is being furnished as a requirement under this contract and is subject to applicable State and federal laws, both criminal and civil.

Signature_____ Date_____

Title: _____

Company: _____

SUBSECTION 4.04 CHANGED CONDITIONS.

This Subsection is revised by deleting the two sequential paragraphs near the end that begin "The Contractor shall be estopped…" and "Any unit item price determined …" (1/6/2006).

SUBSECTION 4.06 INCREASED OR DECREASED CONTRACT QUANTITIES
Replace this Subsection with the following: (Revised – 3/23/ 2007)

The quantities contained in the Contract are set forth as a basis for the comparison of bids only and may not necessarily reflect the actual quantity of work to be performed. The Department reserves the right to increase, decrease or eliminate the quantity of any particular item of work.

Where the actual quantity of a pay item varies more than 25 percent above or below the estimated quantity stated in the Contract, an equitable adjustment in the Contract Price for that pay item shall be negotiated upon demand of either party regardless of the cause of the variation in quantity. No allowances will be made for loss of anticipated overhead costs or profits suffered or claimed by the Contractor resulting directly or indirectly from such increased, decreased or eliminated quantities or from unbalanced allocation among the contract items from any other cause. It is the intention of this provision to preserve the bid basis while limiting the Contractor's risk exposure to 25% of each bid quantity.

In the case of an overrun, the contractor will be compensated at the Contract Unit Price for a quantity up to 125% of the Contract quantity. The adjusted unit price shall only be applied to that quantity above 125% of the contract quantity.

Neither party shall be required to demonstrate any change in the cost to perform the work based solely on the overrun. The original Contract unit bid price shall have no bearing on determining the adjusted unit price for an overrun. The adjusted unit price shall be based on the estimated cost of performing the added work over 125% of the bid quantity. In the event that an adjusted unit price cannot be agreed upon within 60 days after being requested by either party, a unit price will be established that is deemed to be fair and equitable by the Engineer, whether higher or lower than the unit price bid. Payment will be made at that rate until agreement is reached or until the Contractor chooses to exercise his rights under Section 7.16.

To assist the Engineer in the determination of an equitable adjustment for an overrun, the Contractor shall prepare a submission in the following manner and accept as full payment for work or materials an amount for an equitable adjustment in the Contract Price equal to the following:

SUBSECTION 4.06 (continued)

(1) The actual cost or a reasonable cost estimate for direct labor, material (less value of salvage, if any) and use of equipment, plus 10 percent of this total for overhead;
(2) Plus actual cost or a reasonable cost estimate of Worker's Compensation and Liability Insurance, Health, Welfare and Pension Benefits, Social Security deductions and Employment Security Benefits;
(3) Plus 10 percent of the total of (1) and (2) for profit and other unallocated costs;
(4) Plus the estimated proportionate cost of surety bonds.

No allowance shall be made for general superintendence and the use of small tools and manual equipment.

For work performed by a Subcontractor, the Contractor shall accept as full payment therefore an amount equal to the actual cost or the reasonable cost estimate to the Contractor of such work as determined by the Engineer, plus 10 percent of such cost. The Subcontractor is bound by the same criteria for the determination of an equitable adjustment as the Contractor.

In the case of an underrun, the unit price for the actual quantity installed, if less than 75% of the bid quantity, shall only be adjusted to account for increased unit costs that result solely from the decreased quantity. The adjusted unit price shall be the bid price plus the demonstrated unit change in the cost of performing the work due solely to the decreased quantity.

The Contractor shall prepare a submission demonstrating actual increased unit costs for review and evaluation by the Engineer. No allowance will be made for loss of anticipated overhead costs or profits suffered or claimed by the Contractor resulting directly or indirectly from such decreased or eliminated quantities.

The Contractor is required to furnish itemized statements of cost and give the Department access to supporting records.

NOTICE TO PROPERTY OWNERS AT # 115 AND # 127 HIGH STREET

The owners of the properties at #115 and #127 High Street have landscape features within the State Highway Layout. The Contractor shall notify these owners at least 14 calendar days prior to the start of his operations in front of their properties to allow them to remove the landscape features before beginning his operations.

APPROVED EQUIVALENT (Supplementing Subsection 5.03 and Section 6.00)

For any materials named or described in these specifications, an approved equivalent to that named or described in the said specifications may be furnished.

ASPHALT BINDER

In order to allow an efficient transition from viscosity graded Asphalt Cement (AC) specifications to performance graded Superpave Binder (PG) specifications (non-modified binder), the Massachusetts Highway Department is replacing AC graded products with PG binder as follows:

Projects requiring AC-20 will be constructed using PG 64-28
Projects requiring AC-5 will be constructed using PG 52-34

The Contractor shall follow existing mix design requirements and produce the hot-mix using the required grade of PG binder.

The binder supplier shall provide MHD with PG test results and a certification of the PG binder grade when PG binder is substituted for AC grade asphalt. This testing and certification shall be based on the existing lot numbering system.
The binder supplier shall not mix AC and PG binders in the same tank, unless tested and re-certified to meet the specified grade.

Performance-Graded asphalt shall not have a higher temperature grade than specified without prior approval.

BIDDERS LIST

Pursuant to the provisions of 49 CFR 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

MHD will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUY AMERICA PROVISIONS (23 CFR 635.410)
(Supplementing Subsection 6.01 Source of Supply and Quality)

Federal law 23 CFR 635.410 requires that all manufacturing processes, including application of the coating, for steel and iron materials to be permanently incorporated in Federal-aid highway construction projects must occur in the United States. Coating includes all processes which protect or enhance the value of a material to which the coating is applied.

Foreign steel and iron may be used if the cost of the materials as they are delivered to the jobsite does not exceed 0.1% of the total contract cost or $2,500 whichever is greater.

PROMPT PAYMENT AND RELEASE OF RETAINAGE TO SUBCONTRACTORS

The Contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of subcontract work not later than 10 business days from the receipt of each payment the prime contractor receives from MHD. Failure to comply with this requirement may result in the withholding of payment to the prime contractor until such time as all payment due under this provision has been received by the subcontractor(s) and/or referral to the Prequalification Committee for action which may affect the contractor's prequalification status.
The Contractor further agrees to make payment in full, including retainage, to each subcontractor not later than 10 business days after the subcontractor has completed all of the work required under its subcontract.

METRIC MEASURING EQUIPMENT

Six 6' English/Metric Folding Rulers, a 50 meter steel tape, metric/english conversion calculator, 3 - metric engineers' scales shall be provided for the Resident Engineer and his assistants, the cost of which shall be borne by the Contractor. The equipment will remain the property of the Contractor at the completion of the contract.

ITEM 100.01 SCHEDULE OF OPERATIONS - FIXED PRICE $100,000 LUMP SUM

The work under this item shall conform to the relevant provisions of Section 8.00 and Subsection 8.02 of the Standard Specifications, revised as follows, the Plans, and the following:

SUBSECTION 8.02 Schedule of Operations
Revise this Subsection to read as follows:
8.02 Schedule of Operations (Contract Progress Schedule)

A. General Requirements

The Contractor's approach to prosecution of the Work shall be disclosed to MHD by submission of the computerized, cost/resource loaded Construction Schedule required in this Section. These requirements are in addition to, and not in limitation of, requirements imposed in other sections.

The project requires an integrated cost/schedule controls program that the Contractor shall comply with, from Contract award, until final completion of all Work. The Contractor is advised that its schedules and reports, as specified herein, will be an integral part of the MHD's Accelerated Bridge Program management structure. The Contactor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort by its own work forces and consultants, and as a critical decision making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both timely and accurate throughout the life of the project.

This program requires the following schedule submittals by the Contractor:

- Contract Progress Schedule (Baseline, Statused, & Revised versions)
- Proposal Schedules
- Recovery Schedules
- Time Entitlement Analyses

ITEM 100.01 (Continued)

The Contractor shall use computer software capable of preparing, statusing, and revising CRITICAL PATH METHOD (CPM) schedules using precedence diagramming methods, such as Primavera P3, or as approved equal by the Engineer**.** The Accelerated Bridge Program requires extensive and consistent reporting. Because of the complexity of this contract, the Contractor is cautioned against seeking approval for alternative software. In addition to Primavera P3, Primavera Contractor, Primavera P6, and/or SureTrak will be acceptable.

The software shall print activity reports and plot CPM time-scaled logic diagrams, sorted by structures, facilities, subcontractors, submittals, deliveries, change orders, and any other critical features of this Contract.

Within ten (10) Work Days after NTP, the Contractor shall submit to the Engineer sufficient information demonstrating that the CPM software it proposes to use on the Contract is fully capable of producing the specified schedules and tracking tools, change identification output, and is capable of supporting contemporaneous delay analysis, comparable to Primavera products. The Engineer shall notify the Contractor in writing, within seven (7) Calendar Days after receipt of the Contractor's notification on software, if there are any objections to the CPM software selected.

In conjunction with the requirements of Subsection 740 – Engineer's Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the approved scheduling software, licensed as required, along with a computer capable of running the approved scheduling software for the duration of the Contract. This computer and software shall be installed in the Resident Engineer's Field Office. The software shall be updated as necessary during the duration of the contract.

Within 10 days after Contract award, and prior to submission of the initial baseline schedule, the Contractor shall host and conduct a schedule planning session. This session will be attended by MHD and its consultants. During this session, the Contractor shall present its planned approach to the project (including the Work to be performed by the Contractor and its subcontractors) including, but not limited to: the planned construction sequence and phasing; planned crew sizes; summary of equipment types, sizes, and numbers to be used for each work activity; estimated durations of major work activities; the anticipated critical path of the project and a summary of the activities on that critical path; a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges; and a summary of the anticipated quarterly cash flow over the life of the project. This will be an interactive session, and the Contractor shall answer all questions that MHD and its Consultants may have. The Contractor shall provide 5 copies of a written summary of the information presented and discussed during the session to the Engineer. The Contractor's initial Baseline Schedule Revision, 0 and accompanying schedule narrative, shall incorporate the information discussed at this schedule planning session.

ITEM 100.01 (Continued)

B. Schedule Reviews

The Engineer will review the Contractor's schedule submittals and provide comments and disposition; either accepting the schedule or requiring revision and resubmittal of the schedule.

Schedules shall be resubmitted within ten (10) Work Days after receipt of the Engineer's comments.

The Engineer's comments may address whether items of the Work have been omitted, if activity durations are reasonable, or that the means, methods, timing, planned resources, and/or sequencing of the Work are practicable. The planning, scheduling, and execution of the Work, and the accuracy of their representation in the Contract Progress Schedule shall remain the sole responsibility of the Contractor.

The Contractor shall not be relieved from its responsibility for satisfactorily completing the Work within the specified Contract Time due to its failure to submit an acceptable Contract Progress Schedule.

C. Contract Progress Schedules

1. Baseline Schedule

No Application for Payment shall be approved by the Engineer beyond one hundred sixty (60) Calendar Days after Notice to Proceed until the Engineer accepts the Baseline Contract Progress Schedule, unless otherwise agreed to by the Engineer.

The Baseline Contract Progress Schedule shall be submitted within thirty (30) Calendar Days after the Notice to Proceed (NTP) date. The Contract Progress Schedule shall reflect the entire Work as awarded to the Contractor, and shall not include any delays or any Work involving Change Orders. The Cost and Resource Loading requirement may be provided by the Contractor forty-five days (45) after NTP.

The Contractor shall provide a complete listing of all critical and near critical submittals within twenty (20) calendar days after Notice to Proceed. This listing will be required to be updated quarterly, and the critical submittals, shall be included and tracked in the Baseline Schedule and all Progress Schedule updates. This will include the contractor's planned submission date (of a complete submittal; incomplete submittals will not be partially accepted with regard to contract Time), the review period, resubmittals (for those more complicated submittals), and acceptance dates – all actual completion dates shall be provided in the Progress Schedule Update submissions.

ITEM 100.01 (Continued)

The Baseline Contract Progress Schedule shall include all activities and content consistent with the requirements of this section. At a minimum, the Baseline Contract Progress Schedule, as well as all subsequent schedules, shall clearly define the progression of the Work from Notice to Proceed to Final Acceptance by using separate activities for each of the following items:

1. Notice to Proceed
2. All components of the Work – consisting a multiple activities defined by type of work, location, phase, etc.
3. Procurement of permits by the Contractor or the Engineer
4. Submittal preparation and submission
5. Submittal review and return, generally thirty (30) Calendar Days
6. Material and equipment procurement, fabrication, and delivery to the site or storage location.
7. Interfaces with adjacent work, utility companies, public agencies, and/or any other third party work affecting this Contract
8. Interim Milestones listed in Subsection 8.03 or elsewhere in the Special Provisions
9. The critical path, clearly defined and labeled
10. Float, as defined below, clearly identified
11. Traffic Set-up, zone removal, nightwork, and phasing
12. Substantial Completion
13. Punchlist completion period
14. Final Acceptance

Float belongs to the project and is a shared commodity between the Department and the Contractor and is not for the exclusive use or benefit of either party. The float may be claimed by whichever party first demonstrates a need for it, i.e., that Contract Milestones and/or the Contract Completion Date, has been delayed The Contractor shall demonstrate this need as required herein.

The Baseline Contract Progress Schedule shall consist of the electronic data and reports specified herein.

The Baseline Contract Progress Schedule shall be prepared in the approved electronic format described above and shall be submitted in two formats; printed on 11” X 17” sized paper and copied on a portable electronic data storage medium.

Once the Baseline Contract Progress Schedule has been accepted by the Engineer, with or without comments, it will represent the as-planned schedule for the Work. It shall be known as the Baseline Schedule and shall be the Contract Progress Schedule of Record until such time as the schedule is revised under Subsection 8.02.C.3.

ITEM 100.01 (Continued)

2. Requirements for all Schedules

All schedules shall conform to the following requirements:

a) COST AND RESOURCE LOADING: The Contractor is required to provide a Cost/Resource Loaded Schedule with an accurate allocation of the costs and resources to complete the Work for all schedule activities. This requirement will be provided to validate the original plan, monitor the progress, provide Cash Flow projections, and to analyze delays.

- Costs need to be allocated to each Activity and are to be proportional to the scope of the Work of the Activity and consistent with the Contractor's bid.
- Front-loading or other unbalancing of the cost distribution will not be permitted. The sum of the cost of all schedule Activities is to be equal to the Contractor's Bid Price.
- MHD reserves the right to use the Cost-Loading as a secondary means to resolve changes and/or claims.
- Additionally, the Cost-Loaded schedule will be used as basis for payment requisition.
- Indicating the manhours per day, by craft, and equipment hours/day will be acceptable. In addition, all change orders will be required to be resource loaded to validate and monitor the duration of the Work to be performed.

Example:

Resources

0211.000

Resource	0211.000	LABORER	320EXCAV	OPERATOR
Cost Acct/Cate	0211.000			
Driving	☐	☐	☐	☐
Curve				
Units per day	0.00	24.00	1.00	8.00
Budgeted quant	0.00	120.00	5.00	40.00
Res Lag/Duratic	0	0	0	0

ITEM 100.01 (Continued)

Each schedule activity will have an assigned cost consistent with the value of the work to be performed. Each activity will be assigned a cost that added together equals the total Bid Price.

Each schedule activity will have corresponding assigned resources by man-hour consistent with the value of work to be performed and reflective of the Contractor's bid.

b) LOGIC: All schedules shall divide the Work into activities with appropriate logic ties, to show; (i) the Contractor's overall approach to the planning, scheduling, and execution of the Work, (ii) consistency with the requirements of this Subsection, (iii) the Contractor's approach to conformance with any sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.06 – Limitations of Operations of Division I, Special Provisions.

c) ACTIVITIES: All schedules shall clearly and separately define the progression of Work from Notice to Proceed to Final Acceptance by using separate activities for (i) all Work components; (ii) the procurement of permits (by the Contractor or Engineer); (iii) submittal preparation and submission; (iv) submittal review and return, thirty (30) Calendar Days; (v) material and equipment procurement and delivery to the site or location of storage; (vi) interfaces with adjacent work (other public agencies, private owners, and utility companies); (vii) interim milestones listed in Subsection 8.03 of Division I, Special Provisions; (viii) Substantial Completion; and (ix) Final Acceptance.

d) EARLY & LATE DATES: Early Dates shall be based on proceeding with the Work, or a designated part of the Work, exactly on the date when the corresponding Contract Time commences. Late Dates shall be based on completing the Work, exactly on the corresponding Contract Time, even if the Contractor anticipates early completion.

e) DURATIONS: Activity durations shall be in Work Days. Durations shall be regulated by a work breakdown structure (WBS) of physical elements of the Work determined by work discipline, station number, or structure, which reflect the time the Contractor and/or Subcontractor require to perform the related work. In general, installation Activities shall be detailed in a manner that utilizes planned durations from ten (10) to thirty (30) Business Days, and have a value not exceeding $50,000. Activity durations, greater than 30 working days shall be kept to a minimum, and must be approved by the Engineer, except in the case of nonconstruction activities such as procurement of materials, delivery of equipment, and concrete curing. Submittal Review Activities shall be thirty (30) Business Days, unless different review times are specified in other sections of the Contract Documents

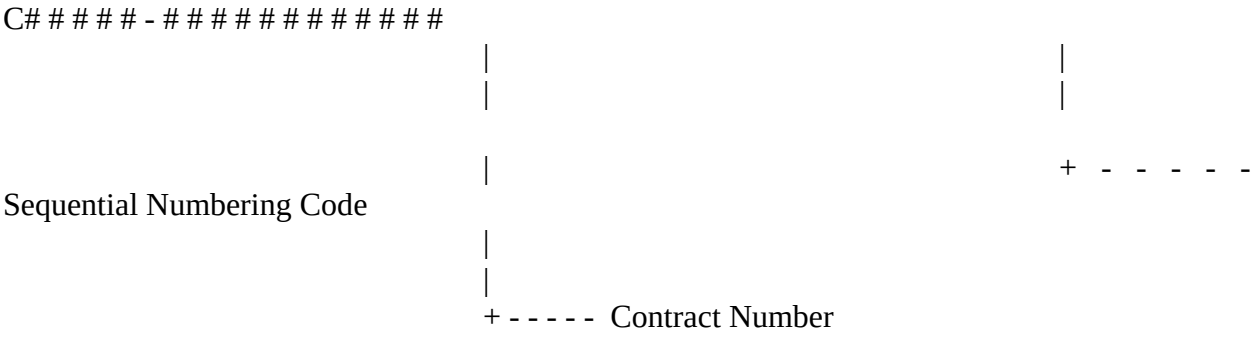
ITEM 100.01 (Continued)

f) ITEMS TO BE PAID: The Contractor shall specifically identify in the Contract Progress Schedule all items of permanent materials and equipment (materials on hand) for which the Contractor intends to receive payment, in accordance with Subsection 9.04 - Partial Payments, prior to the incorporation of such items into the Work.

g) ACTIVITY IDs AND CODES: The Contractor shall use standard activity identification numbers, activity codes, and activity descriptions in all Contract Progress Schedule submittals as specified below.

Activity Identification Numbers

The Contractor shall use the following standard activity identification numbering system for all activities.



CONTRACT NUMBER: The first six characters of the activity identification number shall consist of a “C” for Contract followed by the five-digit MassHighway contract number.

SEQUENTIAL NUMBERING CODE: The second set of characters in the activity identification number, the actual number of characters to be determined by the Contractor, shall consist of a sequential numbering system created by the Contractor denoting work breakdown structure (WBS), locations, station numbers, major areas of construction, structure types, structure designations, class of work, type of activity, bid item number, milestone number, and/or any other type of information that the Contractor wishes to include in its activity identification numbering code.

ITEM 100.01 (Continued)

Activity Codes

The Contractor shall use the following sortable standard activity codes to further define its schedule's activities.

Code	Code Description
DIST	MassHighway District Number
TOWN	Town Name
MSNO	Contract Milestone Number Designation
BIDI	Bid Item Number Designation
STRUC	Type of Structure Designation
RESP	Organization Responsibility Code
OTHR	Other Field

DIST – MassHighway District Number: A one digit code corresponding to the MassHighway District in which the project is located.

	Code Value	Code Value Description
Example:	5	MassHighway District 5

TOWN – Town Name: A four letter code using the first four letters of the name of the city or town in which the project is located.

	Code Value	Code Value Description
Example:	MANS	Mansfield

MSNO – Contract Milestone Number Designation: A two digit code corresponding to the Contract Milestone number contained in Subsection 8.03 of Division I, Special Provisions that is at the end of the activity's sequence chain.

	Code Value	Code Value Description
Example:	03	Milestone No. 3 – Substantial Completion

ITEM 100.01 (Continued)

BIDI – Bid Item Number Designation: A seven digit code corresponding exactly, including periods and spaces, to the bid item number with which the activity is associated.

	Code Value	Code Value Description
Example:	975.3	Metal Bridge Railing
	PCM	Activity added by Proposal or Contract Modification

PROJ – Primary Project Type: A one or two letter code corresponding to the primary project type or type of structure as shown below. Additional codes may be added by the Contractor as approved by the Engineer.

	Code Value	Code Value Description
Example:	BC	Bridge Reconstruction / Rehabilitation
	BN	Bridge New
	BR	Bridge Replacement
	BP	Bike Path
	CB	Catch Basin
	D	Demolition
	H	Highway Reconstruction (local road or state highway)
	HI	Highway Reconstruction (interstate highway)
	P	Painting
	TS	Traffic Signals
	TU	Tunnels
	U	Utilities
	V	Vertical Construction (Chapter 149)

ITEM 100.01 (Continued)

RESP – Organization Responsibility Code: A one to five-digit code corresponding to the initials of the organization responsible for performing the work contained in the activity. Examples of this coding are:

	Code Value	Code Value Description
Example:	MIW	McGillicuddy Iron Works
	BCEC	Bay City Electric Company
	MBTA	Massachusetts Bay Transportation Authority
	CSX	CSX Railroad Corporation
	RE	MassHighway Resident Engineer
	MHD	Massachusetts Highway Department

OTHR – Other Field: An eight digit code reserved for the exclusive use of the Engineer as required for coding miscellaneous items such as contract modifications, submittal activities, time and material work, force account work, or other category of work activity that may prove to need such coding during the progress of the Work.

	Code Value	Code Value Description
Example:	XXX	A description of something other than the above

ACTIVITY DESCRIPTIONS

The activity description shall clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS), and/or elevations in a concise and compact label.

h) NOT TO BE USED: Unspecified milestones or restraint dates, scheduled Work not required for the accomplishment of a Contract Milestone, use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer, delayed starts of follow-on trades, or use of float suppression techniques contrary to the provisions of Subsection 8.05 – Claim for Delay or Suspension of the Work of Division I, Special Provisions shall not be used in the Contractor's Progress Schedule.

ITEM 100.01 (Continued)

3. Contract Progress Schedule Submittal - Reporting Requirements

Both the initial and revised versions of the Contract Progress Schedules shall be submitted for review under the guidelines developed below.

The Contractor shall uniquely identify each Contract Progress Schedule Submittal. Resubmissions shall use the same revision number, followed by the letters A, B, C, and so on, and shall fully address and comply with the Engineer's review comments.

Contract Progress Schedule submittals, including resubmissions and revisions, shall include one (1) complete electronic file copy of the Contract Progress Schedule in an electronic format acceptable to the Engineer and one (1) copy of the following reports and graphs acceptable to the Engineer:

a. The schedule narrative shall: (i) itemize and describe the flow of work for all activities on the critical path; (ii) compare Early and Late Dates for activities on the critical path; (iii) give progress highlights and quantify Work Days gained or lost versus the Contract Progress Schedule Revision of Record; (iv) describe delays, and the Contractor's plan to recover schedule, if appropriate.

The Contract Progress Schedule and Revised Contract Progress Schedule narratives shall: (i) describe resources to be employed on all remaining Work (consistent with or explaining variances from the resource/manhours identified in the specific schedule activities – loaded into the schedules); any deviation from the original plan (ii) describe the Contractor's plan and approach, methodologies and resources to be employed, as represented in the Contract Progress Schedule, for completing the various operations and elements of the Work; (iii) itemize shifts, Holidays, and if multiple calendars are applied to the activities, uniquely identify each calendar; (iv) itemize and explain any proposed changes made in activities, logic ties and restraints. This last item applies to Revised Contract Progress Schedules only.

b. A time-scaled logic diagram on 11x17 sheets, showing the previous month schedule Gantt chart overlay (otherwise known as a target comparison) and the previously approved schedule if applicable/as requested, showing current duration, previous duration, current float, previous float, current and previous Early Start, Late Start, Early Finish, Late Finish, and with current logic ties displayed. These 11x17 sheets are to be organized to be consistent with the activity codes described in Subsection 8.02.C. and shall be provided for each type of schedules submission contained herein. Activities shall be linked by logic ties and be shown on the Early Dates. The Critical paths shall be highlighted and Total Float shall be shown for all activities.

ITEM 100.01 (Continued)

4. Revised Contract Progress Schedules

Upon review and acceptance by the Engineer of activities and logic ties in Proposal Schedules, prepared in accordance with Subsection 8.02.C.6, and Recovery Schedules prepared in accordance with Subsection 8.02.C.7, such activities shall be incorporated into the next Statused Contract Progress Schedule as a Revised Contract Progress Schedule. All schedule changes shall be developed in accordance with Subsection 8.02.C. A Revised Contract Progress Schedule shall be due with the Application for Payment following the Engineer's acceptance of the schedule changes and shall consist of the required electronic data and reports specified in Subsection 8.02.C.4, as supplemented below.

Revised Contract Progress Schedules shall include a comprehensive listing of all activities added to or deleted from the Contract Progress Schedule of Record as well as a complete listing of all logic and activity relationship changes which have been made. All changes in the schedule must be fully described in an accompanying narrative.

Revised Contract Progress Schedules shall be prepared in the approved electronic format described above and shall be submitted in two formats; printed on 11” X 17” sized paper and copied on a portable electronic data storage medium.

Once a Revised Contract Progress Schedule has been returned by the Engineer to the Contractor as "Resubmittal Not Required", with or without comments or objections noted, it shall become the Revised Contract Progress Schedule of Record, meaning it is to be used for subsequent Statused Contract Progress Schedules, and shall be referred to by its revision number.

Except as otherwise designated by a Contract Modification, no Revised Contract Progress Schedule that extends performance beyond any Contract Time and/or Contract Milestone shall qualify as a Revised Contract Progress Schedule of Record.

ITEM 100.01 (Continued)

5. Statused Contract Progress Schedule Requirements

Statused (updated) Contract Progress Schedules shall be submitted by the Contractor coinciding with the first Contract Quantity Estimate (CQE or "pay estimate") of each month. Except as provided elsewhere in this subsection, Statused Contract Progress Schedules shall update and replace the Contract Progress Schedule of Record.

A Statused Contract Progress Schedule shall consist of the following:

1. A Schedule Narrative consistent with Subsection 8.02.

2. All documentation required by the Contract to support the CQE.

Each Statused Contract Progress Schedule shall reflect updated progress to the status date, shall forecast the finish dates for in-progress activities and remaining activities, but shall not change any activity descriptions, durations, or sequences of work, planned resources (manhours) costs, without the acceptance of the Engineer. Updated progress shall be limited to as-built sequencing and as-built dates for completed and in-progress activities. As-built data shall include actual start dates, remaining Work Days, and actual finish dates for each activity.

Statused Contract Progress Schedules shall be prepared in the approved electronic format described above and shall be submitted in two formats; printed on 11" X 17" sized paper and copied on a portable electronic data storage medium.

No CQE shall be approved by the Engineer until the Contract Progress Schedule has been submitted.

6. Proposal Schedules & Time Entitlement Analyses

Proposal Schedules and Time Entitlement Analyses (TEAs) shall be developed in accordance with this Subsection when the Contractor's operations are materially affected by changes in the Plans and/or if requested by the Engineer. The Contractor shall submit a Proposal Schedule or TEA within ten (10) Work Days following the Engineer's request or within ten (10) Work Days from the initial occurrence which caused a deviation from the current Contract Progress Schedule of Record. This required ten (10) Work Day period may be extended as necessary subject to acceptance by the Engineer. The Proposal Schedule or TEA shall be developed using duplicate electronic files of the current Contract Progress Schedule of Record.

ITEM 100.01 (Continued)

Proposal Schedules and TEAs shall also be used by the Contractor to negotiate with the Engineer the schedule impact of an Extra Work Order (EWO.) Proposal Schedules and TEAs shall (i) incorporate all proposed activities and logic ties required to implement the EWO, (ii) detail all impacts on pre-existing activities and logic ties, and (iii) detail the actual resources expended for past critical path activities, with a comparison vs planned resources/manhours, (iv) detail the planned resources required to complete the EWO, (v) attach separate time-scaled logic diagrams with the proposed and pre-existing activities and logic ties involved in or affected by each EWO.

Proposal Schedules and TEAs shall consist of the submittal requirements specified in Subsection 8.02.C.2. Furthermore, Proposal Schedules and TEAs shall accurately reflect all revisions and/or adjustments made to activities, logic ties and restraints that are necessary to reflect the Contractor's current approach for Work remaining.

Proposal Schedules and TEAs shall be prepared in the approved electronic format described above and shall be submitted in two formats; printed on 11” X 17” sized paper and copied on a portable electronic data storage medium.

Accepted changes shall be submitted as "Revised Progress Schedules" per the requirements of Subsection 8.02.C.3.

7. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work.

The Contractor shall promptly develop a Recovery Schedule whenever one of the following occurs:

1.) The Contract Progress Schedule of Record’s critical path exceeds the greater of:
a) A delay of twenty (20) Calendar Days, or
b) A delay equal to 5% of the Work Days remaining until the Contract Completion Date;

2.) The Contractor cannot comply with the Contract Progress Schedule of Record;

3.) The Engineer requests it. If requested by the Engineer, the Contractor shall submit a separate Recovery Schedule, prepared in accordance with Subsection 8.02B, within ten (10) Work Days and submit it no later than the submittal of the next Statused Contract Progress Schedule.

ITEM 100.01 (Continued)

Recovery Schedules shall be used by the Contractor to notify the Engineer of revisions to logic ties and activities of the Contract Progress Schedule of Record. Recovery Schedules shall include a separate time-scaled logic diagram of the activities impacted and a narrative describing the causes of any delay and the actions planned, and resources required, to recover schedule to meet the Contract Completion Date.
Recovery Schedules shall be prepared in the approved electronic format described above and shall be submitted in two formats; printed on 11" X 17" sized paper and copied on a portable electronic data storage medium.
Failure to submit a Recovery Schedule could result in withholding of full or partial Contract Quantity Estimate payments by the Engineer.

8. Disputes
As stated in Subsection 8.02 it is the intent of this Contract that all schedules be submitted, reviewed, dispositioned, and accepted in the timely manner specified so as to provide the greatest possible benefit to the execution of this Contract.
Any dispute concerning the acceptance of a schedule or any other question of fact arising under this subsection shall be determined by the Engineer.
Pending resolution of any dispute, the last schedule accepted by the Engineer will remain as the Contract Schedule of Record as described in Subsection 8.02.

MEASUREMENT AND PAYMENT

Basis of Payment
The project requires all Project progress submittals specified in Section 8.02 of the Supplemental Specifications and Item 100.01 SCHEDULE OF OPERATIONS - FIXED PRICE $100,000 that the Contractor shall provide as specified above. A fixed price of $100,000 will be provided to the contractor for these Project Schedule Submittal requirements. The Contractor is advised and/or cautioned that this "fixed price" value is separated from what the Department considers to be the Contractors indirect/general condition costs for payment purposes only and, if the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs should be included in the Contractor's general conditions. Note: This Fixed Price payment item is added to the Departments bid form with this predetermined and/or fixed amount. Each bidder is directed to add and/or include this fixed price bid item value to the total bid value – failure to do so will be grounds for the rejection of the bid.

ITEM 100.01 (Continued)

Payment will be made under Item No. 100.01, SCHEDULE OF OPERATIONS - FIXED PRICE $100,000.00, with the following breakdown:

Fifteen percent (15%) of the FIXED PRICE will be made upon return to the Baseline Construction Contract Schedule as "Resubmittal Not Required" (As-Planned Schedule).

The remaining (85%) will be pro-rated in equal monthly amounts on each subsequent application for payment upon the Engineer's receipt and acceptance of the monthly schedule update submittals. The number of months to be used for the pro-rating will be the number of months estimated to complete the work.

All payments are subject to retainage.

ITEM 100.9 PRE-CONSTRUCTION SURVEY AND VIBRATION MONITORING OF HISTORIC HOUSES **LUMP SUM**

The work under this item shall include performing a pre-construction survey of (6) historic houses adjacent to the project area. The locations include #103 High St., #106 High St., #108 High St., and #110 High St., which are listed in the National Register of Historic Places as contributing properties within the High Street Historic District, and #115 High Street and #124 High Street, which have been determined to be eligible for individual listing in the National Register. Also included under this item is vibration monitoring of the houses both prior to and during construction and performing pre-construction video inspections of the basement walls and visible foundation.

CONSTRUCTION METHODS

1. Building Survey

The Contractor shall retain and pay an experienced Professional Engineer registered in the Commonwealth of Massachusetts to perform a pre-construction survey of the six historic houses. The Contractor shall contact the Director of Planning and Development, Town of Ipswich for contact information for the residences. The purpose of the survey shall be to document the pre-construction condition of those houses. This survey, as a minimum, shall locate, measure, photograph and otherwise document any visible cracks, defects, distortion, settlement, and other signs of distress in each historic house prior to construction. The product shall be six separate reports, one for each residence. Each report shall be an original written report stamped and signed by the Engineer performing the survey and six (6) copies, including photographs, DVD's, plans, sketches and attachments, which shall be submitted to the Engineer a minimum of five (5) days prior to commencement of any construction activity. Copies of the report shall be distributed to the MHD Resident Engineer, MHD Cultural Resources Unit, the Contractor, the Ipswich Historic Commission, Town of Ipswich Director of Planning and Development, and the homeowner. A cover letter shall be included with the reports, containing contact information for the MassHighway Cultural Resources Unit and the MassHighway Resident Engineer.

2. Building Vibration Monitoring

The Contractor shall install one seismograph in the basement of each of the six historic houses prior to the start of construction. The seismograph shall be located on the lowest working level of the structure. The exact location shall be coordinated with the Owner(s). The Contractor shall submit a vibration monitoring plan listing all required equipment and showing its proposed location within the structure. The plan shall also describe the monitoring procedures to be followed. Copies of the plan shall be distributed to the Resident Engineer, the CRU and Ipswich Historic Commission. This plan shall be submitted not less than fifteen (15) days prior to the commencement of the baseline monitoring period. The seismograph shall have the following minimum features:

ITEM 100.9 (Continued)

- Seismic range: 0.01 to 4 inches per second with an accuracy of +/- 5 percent of the measured peak particle velocity or better at frequencies between 10 Hertz and 100 Hertz, and with a resolution of 0.01 inches per second or less.
- Three channels for vibration monitoring.
- Two power sources: internal rechargeable battery and charger and 115 volts AC. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.
- Instruments must be capable of producing strip chart recordings and readings on site within one hour of obtaining readings. Provide computer software to perform analysis, produce reports of continuous monitoring.
- Continuous monitoring mode must be capable of recording single-component peak particle velocities, and frequency of peaks with an interval of one minute or less.

Certification shall be provided to indicate that the test equipment used for this purpose is calibrated and maintained in accordance with the test equipment manufacturer's calibration requirements and that, where applicable, calibrations are traceable to the National Institute of Standards and Technology.

The Contractor shall operate the seismograph for a minimum of five (5) consecutive 24-hour periods prior to the start of construction to establish baseline levels. Copies of the report summarizing the recorded baseline levels shall be distributed as outlined previously a minimum of five (5) days prior to commencement of any construction activity.

Following the start of construction the Contractor shall monitor the vibration levels on an ongoing basis during the following activities: driving of sheet piles, demolition of the existing bridge structure, pile driving, structural excavation or other activities as required by the Engineer. The Contractor shall maintain records of the vibration levels and shall submit a report of these levels as requested by the Engineer. The threshold value for peak particle velocity vibration criteria shall be 12.7 millimeters per second (1/2-inch per second). If measurements exceed the threshold value, the following actions shall be taken:

1. Verify measurement reading
2. Double the frequency of readings
3. Notify the Engineer. Hold a meeting with representatives of the Contractor and MassHighway. Ensure work is being performed in accordance with the Contract Documents. Meeting to be held within 48 hours of exceeding the threshold value.

The limiting value for peak particle velocity vibration criteria shall be 25.4 millimeters per second (1-inch per second).

ITEM 100.9 (Continued)

If measurements exceed the limiting value, the following actions shall be taken:

1. Stop construction operations immediately
2. Verify measurement reading
3. Notify the Engineer, he Ipswich Historic Commission and the Cultural Resources Unit. Hold a meeting with representatives of the Contractor and MassHighway immediately.
4. Inspect buildings in the vicinity of where the limiting value has been measured.

Based on the level of damage identified, follow the directions outlined below:

a. No Damage to Slight damage (as defined by Boscardin and Cording); Proceed with construction operations while monitoring the condition of the building. Monitoring shall be continuous during the hours that construction operations are being performed. If building damage is noted to reach the Moderate level (as defined by Boscardin and Cording) during the monitoring, stop construction activity. Proceed to b.

b. Moderate to severe damage (as defined by Boscardin and Cording); Install preventative measures to prevent further damage to the building before proceeding with construction activity. Preventative measures may include underpinning the building, and/or building frame supplementary support/stabilization. The Contractor, MassHighway, the Town of Ipswich , the Ipswich Historic Commission and the affected property owner must all approve the proposed additional measure before the measure is implemented. Once the measure is implemented, proceed with construction operations while monitoring of the condition of the building. Monitoring shall be continuous during the hours that construction activity is being performed. If additional damage is noted, stop construction activity and repeat the above procedure relative to additional preventative measures.

During all monitoring of vibration-producing construction activities the Contractor shall document all events that are responsible for the measured vibration levels, and submit the documentation to the Engineer with the data.

3. Coordination

The Contractor shall coordinate with the Engineer and the (6) property owners to schedule the facility survey and to establish the location of the seismograph.

ITEM 100.9 (Continued)

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CLASSIFICATION OF VISIBLE DAMAGE

Class of Damage	**Description of Damage** (a)	**Approximate Width of Cracks, m** (b)
Negligible	Hairline cracks	<0.1
Very Slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior brickwork visible upon close inspection.	<1
Slight	Cracks easily filled. Re-decoration probably required. Several slight fractures inside building. Exterior cracks visible, some repointing may be required for weathertightness. Doors and windows may stick slightly.	<5
Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possibly replacement of a small amount of exterior brickwork may be required. Doors and windows sticking. Utility service may be interrupted. Weathertightness often impaired.	5 to 15 or several cracks > 3 mm
Severe	Extensive repair involving removal and replacement of sections of walls, especially over doors and windows required. Windows and door frames distorted, floor slopes noticeably. Walls lean or bulge noticeably, some loss of bearing in beams. Utility service disrupted.	15 to 25 also depends on number of cracks
Very Severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and require shoring. Windows broken by distortion. Danger of instability	Usually >25 Depends on number of cracks

ITEM 100.9 (Continued)

The Contractor shall coordinate with the Engineer and the (6) property owners to schedule the facility survey and to establish the location of the seismograph (a) Location of damage in the building or structure must be considered when classifying degree of damage.

Crack width is only one aspect of damage and should not be used on alone as a direct measure of it.

MEASUREMENT AND PAYMENT

The Item 100.9 PRE-CONSTRUCTION SURVEY AND VIBRATION MONITORING OF HISTORIC HOUSES consists of 6 reports (one for each building), monitoring of the vibration of buildings and reporting the damage as the work progresses. Work under the item will be paid at Contract Bid Unit Price per LUMP SUM in full compensation for all labor, transportation, materials, equipment and expertise required to complete the work, to be paid with the following breakdown:

A sub-total of fifteen percent (15%) of the Lump Sum price will be paid at a pro-rated basis as the 6 (six) individual reports are submitted upon verification, approval and acceptance by the Engineer.

The remaining (85%) will be paid at a pro-rated basis on monitoring of the vibration of the 6 (six) buildings and reporting the damage as the work progresses.

All payments are subject to retainage.

REFERENCE

Boscardin, M.D. and Cording, E.G. (1989), Building Response to Excavation-Induced Settlement. Journal of Geotechnical Engineering, ASCE, 115;1-21.

ITEM 102.51 INDIVIDUAL TREE PROTECTION EACH

The purpose of this item is to prevent damage to branches, stems and root systems of existing individual trees to remain and to ensure their survival. Provisions under this item include steps to minimize soil and root disturbance and to construct protection measures for trees close to construction areas.

The work under this item shall conform to the relevant provisions of Sections 101 and 771 and the following:

Examination of Conditions

The Contractor shall be solely responsible for judging the full extent of the work requirements, including, but not necessarily limited to any equipment and materials necessary for providing tree protection.

Prior to any construction activities, the Contractor and Arborist shall walk the site with the Engineer and Town Tree Warden to identify which trees will require protection and to determine approved measures. The Arborist shall make recommendations as to appropriate methods to trees. The Engineer will have final decision as to trees and methods.

The Contractor is responsible for the protection of all existing trees and plants within and immediately adjacent to the construction area that are not designated to be removed for the length of the construction period.

Incidental to the cost of these items, the Contractor shall retain the services of a certified arborist, who shall make recommendations as to the specific appropriate treatment of trees within or near the work zone.

SUBMITTALS

Incidental to this item, the Contractor shall provide to the Engineer one (1) copy each of “Standards for Pruning Shade Trees” of the National Arborist Association, 174 Route 101, Bedford, New Hampshire, 03102, and American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his office for the length of the Contract.

Prior to start of work, the Contractor shall submit to the Engineer the name and certification number of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this item.

ITEM 102.51 (Continued)

MATERIALS

Fence and temporary fence posts shall be subject to the approval of the Engineer.

Fencing for individual plants shall be polyethylene fencing or chain link fence (new or used), as specified under Standard Item 657, Temporary Fence.

Staking for individual tree protection fencing shall be steel posts or 50x100 mm (2x4 inch) stock as directed and approved by the Engineer.

Wood chips shall conform to provisions of Wood Chip Mulch under Materials Section M6.04.3.

Trunk protection shall be 50x100 mm (2x4 inch) cladding, at least 2.44 meters (8 feet) in length, clad together with wire. Trunk protection shall include burlap.

Incidental to these items, the Contractor shall provide water for maintaining plants in the construction area that will have exposed root systems for any period during construction.

CONSTRUCTION METHODS

To the extent possible, to avoid soil compaction within the root zone, construction activities including, but not limited to, vehicle movement, excavation, embankment, staging and storage of materials or equipment shall not occur underneath the canopy (drip line) of trees to remain. Where these activities will occur within 3 meters of the canopy of trees, the Contractor shall provide Individual Tree Protection as specified herein.

TREE FENCING AND ARMORING

For individual tree protection, the Contractor shall set posts and fencing at the limits of the tree canopy. Where construction activities closer to the trees is unavoidable, the contractor shall tie branches out of the way and place wood chips to a depth of 152 mm (6 inches) on the ground to protect the root systems. The Contractor shall wrap the area of the trunk of the tree with burlap prior to armoring with 50x100 mm (2x4 inch) cladding. Cladding for tree trunks shall extend from the base of the tree to at least 2.44 meters from the base.

Where excavation within canopy is unavoidable, the Contractor shall use equipment and methods that shall minimize damage to the tree roots, per recommendations of the Certified Arborist. Such methods may require root pruning prior to, as well as during, any excavation activities.

All fencing, trunk protection, branch protection, and woodchips shall be maintained throughout the duration of the contract. Protective fencing shall be repaired and woodchip mulch replaced as necessary during the duration of the contract at no additional cost.

ITEM 102.51 (Continued)

CUTTING AND PRUNING

Some pruning of roots and branches may be a necessary part of construction. Pruning will be performed on the same side of the tree that roots have been severed.

The Contractor shall retain the services of a Massachusetts State Certified Arborist to oversee any cutting of limbs, stem or roots of existing trees. All cuts shall be clean and executed with an approved tool. Under no circumstances shall excavation in the tree protection area be made with mechanical equipment that might damage the existing root systems.

Any tree root area exposed by construction shall be covered and watered immediately. Exposed tree roots shall be protected by dampened burlap at all times until they can be covered with soil.

WATERING

Water each tree within the construction area where work is in progress twice per week until the surrounding soil of each tree is saturated for the duration of construction activities.

REMOVAL OF PROTECTION

After all other construction activities are complete, but prior to final seeding, wood chips, temporary fencing, branch protection, and trunk protection materials shall be removed and disposed off site by the Contractor at no additional cost.

TREE DAMAGE

The Contractor shall be held responsible for the health and survival of the existing trees in the immediate vicinity of the of the construction area. Damage that, in the Engineer's opinion, can be remedied by corrective measures shall be repaired immediately. Broken limbs shall be pruned according to industry standards. Wounds shall not be painted. Trees or shrubs that are damaged irreparably shall, at the Engineer's discretion, be replaced per the requirements of Division I of these Special Provisions. Cost of replacement trees shall be borne by the Contractor.

MEASUREMENT AND PAYMENT

The quantity of ITEM 102.51, INDIVIDUAL TREE PROTECTION shall be measured for payment by the count of each. Work under the item will be paid at Contract Bid Unit Price per EACH in full compensation for the services of a certified arborist, all labor, materials, wood chips, water, fertilizer and equipment required to complete the work including the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract. Temporary Fencing for trees will be paid under Item 657.

ITEM 114.1 DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. I-01-007 **LUMP SUM**

The work under this Item shall conform to the relevant provisions of Section 112 and Section 960 of the Standard Specifications and shall include the demolition, removal and satisfactory disposal of all materials making up the bridge superstructure as directed.

The Contractor shall coordinate his activities with the MBTA Railroad in accordance with the relevant provisions of the railroad special provisions and the following:

The Contractor shall prepare and submit to the Engineer and Railroad, for approval, a plan indicating his/her proposed demolition procedures and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, details of temporary protective shielding, etc… The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61D, Erection, of the Standard Specifications for Highway Bridges and the Supplemental Specifications. The demolition procedure and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. Work under this item may not commence until the Engineer and Railroad have given written approval of the method of demolition.

The Contractor shall take all measures necessary to prevent any debris resulting from demolition or equipment from falling onto the railroad or onto railroad property. Any material or equipment that accidentally falls onto railroad property shall be removed immediately at the Contractor's expense. The Contractor shall also take extreme caution to ensure no damage to the existing railroad tracks as a result of the Contractor's demolition/construction operations. Should any damage occur to the existing tracks, it shall be the Contractor's responsibility to repair such damage as directed by the Engineer or Railroad and shall be done at the Contractor's expense.

ITEM 114.1 (Continued):

All materials removed under this Item shall become the property of the Contractor and shall be properly disposed of in accordance with the Standard Specifications and these Special Provisions. All existing members shall be suitably braced and supported throughout the demolition process. During the prosecution of work, the Engineer may reject any method or use of equipment that is deemed unsuitable.

MEASUREMENT AND PAYMENT

The Item 114.1 DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. I-01-007 will be paid at Contract Bid Unit Price per LUMP SUM with a breakdown mutually agreed upon by the Engineer and the Contractor prior to starting the work under this item. The total payment under this item will be in full compensation for all labor, transportation, materials, equipment and expertise required to complete the work, to be paid as the work progresses.

Any costs associated with hazardous materials, in terms of testing, loading, transportation, disposal, approvals, and permits necessary, not covered under the provisions of Item Nos. 180.1, 180.2, 180.3, 180.4, 180.5, 180.6, 181.1, 184.1, 187.3 and 187.31 will be incidental to Item 114.1.

ITEM 120.1 UNCLASSIFIED EXCAVATION CUBIC METER

The work to be done hereunder consists of removing and disposing in accordance with the relevant provisions of Section 120, all materials required for execution of the required work as shown on the plans and as directed, except materials for which payment is made under the items of Class A Trench Excavation, Class B Trench Excavation and Class B Rock Excavation of this contract, and except those materials for which payment is made under other items of this contract. Excavation for placing lightweight aggregate fill is included in this item. Excavation for constructing retaining walls shall be paid for under Item 140.

This work shall include excavation and satisfactory disposal of present roadway surfaces, excess or damaged curbing, fences, muck, peat, organics, etc., which are encountered in the formation of the subgrade within the slope limits of the proposed roadway, or as directed by the Engineer.

Also included shall be the removal and disposal of all other materials not designated to be reused on the project. All granite curb which cannot be reused on this project shall be removed and disposed of under this item, including curb that is designated to be removed and discarded. The removal and disposal of the commercial sign at STA 36+45± LT for the vegetable stand shall be included under this item. Drainage structure frames and grates not being reused shall be discarded under this item. The Engineer shall determine the disposition of all materials with respect to removal and disposal.

The removal of all trees, brush and shrubs within the slope limits that are not included for payment in Item 103. or Item 104. are included under this item.

The removal of the landscape timbers, also referred to as railroad ties, shall be included under this item. Disposal of the landscape timbers shall be paid for under Item 184.1.

Edges of excavations made in existing pavements shall be squared by sawcutting with power-driven tools to provide a neat, clean edge for joining new pavement as shown on the plans. Pavement areas which have been broken or undermined shall be edged neatly with a minimum disturbance to the remaining pavement. (Payment for sawcutting pavements will be made under Item 482.3).

ITEM 120.1 (Continued):

Foundations left in place under roadway surface shall be removed to a depth of 1 meter ; all other foundations left in place shall be removed to a depth of 300 millimeters below the finished grade.

The area shall be restored to match the existing or proposed grade with materials similar in kind to the abutting materials and will be paid for under the pertinent items.

The Contractor shall perform all excavation in such a manner as to maintain slopes, longitudinally and laterally and to insure proper and continuous drainage at all times.

MEASUREMENT AND PAYMENT

The quantity of Item 120.1 UNCLASSIFIED EXCAVATION shall be measured for payment by the cubic meter of work completed and accepted. Work under the item will be paid at Contract Bid Unit Price per CUBIC METER in full compensation for all labor, transportation, materials, equipment and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 127.1 REINFORCED CONCRETE EXCAVATION CUBIC METER

The work under this Item shall conform to the relevant provisions of Section 112 of the Standard Specifications and shall include the partial demolition and disposal of the concrete abutments, piers and wingwalls to the extents shown on the Plans or as directed by the Engineer. All necessary earth excavation to accomplish the partial demolition of the substructure shall be considered incidental to Item 140 "Bridge Excavation."

The substructure consists of two spill-through concrete abutments, four concrete wingwalls and four concrete multi-column piers.

All concrete removed under this item shall become the property of the Contractor and shall be disposed of by him away from the work site.

The Contractor shall take all measures necessary to prevent any debris resulting from demolition or equipment from falling onto the railroad or its property. Any material or equipment that accidentally falls onto railroad property shall be removed immediately at the Contractor's expense. Any work adjacent to the tracks shall meet all the requirements of the Railroad Specifications and shall not commence until approval from the Engineer and Railroad has been received.

Work under this item will be paid at the Contract Unit Bid Price per CUBIC METER of concrete substructure removed, which price shall include full compensation for all labor, equipment, materials, and tools necessary to accomplish the specified work in a manner satisfactory to the Engineer, including sawcutting and/or jack hammering of concrete. Compensation for the removal of superstructure concrete is provided for under Item 114.1 "Demolition of Superstructure of Bridge No. I-01-007."

MEASUREMENT AND PAYMENT

The quantity of Item 127.1 REINFORCED CONCRETE EXCAVATION shall be measured for payment by the cubic meter of work completed and accepted. Work under the item will be paid at Contract Bid Unit Price per CUBIC METER in full compensation for all labor, materials, equipment and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 153.2 LIGHTWEIGHT AGGREGATE FILL CUBIC METER

The Item shall be placed behind the existing abutments, proposed abutments, retaining walls, and wingwalls, below the special slope paving and below the roadway base to the limits indicated on the plans and as directed. Excavation required prior to placement of lightweight fill shall be included under Item 120.1 Unclassified Excavation or Item 140. Bridge Excavation, as appropriate.

Lightweight aggregate fill shall be an approved rotary kiln expanded shale meeting all the requirements of ASTM C-330. No by-product slag, cinders or by-products of coal combustion shall be permitted. Lightweight aggregate shall have a proven record of durability, as determined by ASTM C-88 and ASTM C-131, and be non-corrosive, as determined by CAL DOT 422 with the following physical properties:

1. Delivered Gradation:

Sieve Size	% Passing
25 mm	100
19 mm	90 – 100
9.5 mm	10 – 50
4.75 mm	0 – 15

2. The dry loose density shall be less than 800 kg/m^3.
3. The maximum in situ density (moist, surface dry) shall be less than 960 kg/m^3. The minimum compacted dry density shall be equal to 65% relative density as determined by ASTM D-4253 and D-4254, or as otherwise specified by the Engineer.
4. The maximum soundness loss when tested with 5 cycles of magnesium sulfate shall be 10% (ASTM C-88).
5. The maximum chloride content (CAL DOT 422) shall be 100 ppm.
6. The minimum strength of loosely placed material, as determined from drained triaxial tests, shall equal that of cohensionless soil with an angle of internal friction of 36°. Minimum strength of material compacted to 65% relative density shall equal that of a cohensionless soil with an angle of internal friction of 40°.

Lightweight fill can be placed in approximately uniform layers not to exceed 300 mm loose thickness. Each layer shall be compacted using vibratory compaction equipment weighing not more than 12 metric tons static weight. The actual lift thickness, exact number of passes, and need for vibrating the roller will be determined by the Engineer, depending on the project requirements (i.e. strength, compressibility, unit weight) and equipment used. The material shall not be over-compacted. Construction equipment, other than for compaction, shall not operate on the exposed lightweight fill.

The top surface of the lightweight fill lying directly below the gravel course shall be chinked by additional rolling of the lightweight fill to prevent infiltration of fines.

This item shall be measured and paid for by the cubic meter of work complete in place and accepted which shall be full compensation for all labor, materials, equipment and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 156. CRUSHED STONE MEGAGRAM

The work under these items shall conform to the relevant provisions of Section 150 and the following:

Crushed stone for pipe bedding, when unsuitable material is found, shall meet the requirements of 19.050 mm stone.

Crushed stone for slope treatment at STA34+09± RT to STA 34+16± RT shall meet the requirements of 37.5 mm stone. The stone shall be placed to a depth of 300 mm.

Crushed stone material for stabilizing trench base shall meet the requirements for 31.750 mm stone.

The quantity of Item 156. CRUSHED STONE will be measured as per Standard Specification for payment in megagram, based on countersigned weight slips, complete in place and accepted, with no percentage added. Work under the item will be paid at Contract Bid Unit Price per MEGAGRAM in full compensation for all labor, transportation, materials, equipment and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 180.1 HEALTH AND SAFETY PLAN LUMP SUM

It is the Contractor's ultimate responsibility to ensure the health and safety of all the Contractor's employees and subcontracting personnel, the Engineer and his representatives, and the public from any on-site chemical contamination.

A Health & Safety Plan (HASP) shall be prepared by a Certified Industrial Hygienist or other experienced individual with the appropriate training required by OSHA to prepare such a plan, and it shall include the components required by OSHA 29 CFR 1910.120(b). The preparer's name and work experience shall be included as part of the Health and Safety Plan submittal. The HASP must be stamped by a Certified Industrial Hygienist certifying that it complies with all applicable laws, regulations, standards and guidelines, and that it provides a degree of protection and training appropriate for implementation on the project during the execution of this contract.

The HASP shall be designed to identify, evaluate, and control health and safety hazards associated with the work on this project and provide for emergency response if needed. The HASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions (e.g. OSHA, RCRA, CERCLA). In addition, guidelines of NIOSH, OSHA, USCG, EPA, etc., shall be followed. Equipment used for the purpose of health and safety shall be approved and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the Health and Safety Plan shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the Department, Contractor and subcontractors. The employee's signature on the Health and Safety Plan shall be deemed prima facie evidence that the employee has read and understands the plan. A copy of the plan with signatures shall be submitted to the Engineer at the conclusion of the Contract, or at the Engineer's request. Signature sheets shall be submitted monthly, or at the request of the Engineer.

MEASUREMENT AND PAYMENT

Item 180.1 HEALTH AND SAFETY PLAN be paid at Contract Bid Unit Price per LUMP SUM with a breakdown mutually agreed upon by the Engineer and the Contractor, based on initial submittal of the HASP and its subsequent updating and revisions to reflect new information, new practices or procedures, changing site environmental conditions or other situations. The total payment under this item will be in full compensation for all labor, transportation, materials, equipment and expertise required to complete the work, to be paid as the work progresses

ITEM 180.2 IMPLEMENTATION OF HEALTH AND SAFETY PLAN HOUR

For all construction activities which require handling or exposure to potentially hazardous materials, the Health and Safety Plan shall specify an on-site Safety Officer. The Site Health and Safety Officer duties shall include, but are not limited to: implementation of the site Health and Safety Plan, training, evaluating risks, safety oversight, determining levels of personnel protection required, and performing any required monitoring at the site. A Daily Log shall be kept by the on-site Safety Officer and provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personnel protection being employed, monitoring data and any other information relevant to on-site safety conditions. The Site Health and Safety officer shall sign and date the Daily Log.

In the event that subsurface contamination is discovered during construction, the Site Safety Officer shall be present to oversee all handling, storage, sampling, and transport of such contaminated materials.

The level of protection, relative to respiratory and dermal hazards, required to ensure the health and safety of on-site personnel will be stipulated in the Health and Safety Plan and will be subject to modification by the on-site Safety Officer based on changing site and weather conditions and the following factors: type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and equipment, and type of equipment to be utilized.

The Contractor shall be required to provide appropriate personnel protective equipment for anyone who is working in an area either containing or suspected of containing a hazardous environment. This work will include both individuals physically working in these areas and those directing the work of same. Contingencies for upgrading the level of protection for on-site workers will be identified in the Health and Safety Plan and the contractor shall have the necessary materials/equipment on hand to implement the level of protection upgrade in a timely manner. Payment for this level of upgraded protection shall be paid for under Item 180.3.

Implementation of the Health and Safety Plan will be paid at the contract bid price per hour and shall include the cost of enforcement by an on-site Safety Officer.

MEASUREMENT AND PAYMENT

The quantity of Item 180.2 IMPLEMENTATION OF HEALTH AND SAFETY PLAN shall be measured for payment by the count of each hour of implementing and enforcing the HASP plan by an on-site Safety Officer. Work under the item will be paid at Contract Bid Unit Price per HOUR in full compensation for the services of an on-site Safety Officer, all labor, materials, equipment and expertise required to complete the work. Personnel protective clothing and equipment for Level "C" Protection shall be considered incidental to the project and the cost shall be borne by the contractor.

ITEM 180.3 PERSONNEL PROTECTION LEVEL 'C' UPGRADE HOUR

The Contractor shall provide to all workers, protective clothing appropriate to the hazard level of the work. The protective equipment and its use shall be in strict compliance with the Health and Safety Plan (Item 180.1), and all appropriate regulations that address employee working conditions.

The quantity of Item 180.3 PERSONNEL PROTECTION LEVEL 'C' UPGRADE shall be measured for payment by the count of each hour of providing to all workers, protective clothing appropriate to the hazard level of the work. Work under the item will be paid at Contract Bid Unit Price per HOUR per person in full compensation for all labor, materials, equipment and management required to complete the work.

ITEM 180.4 MONITORING/HANDLING AND STOCKPILING OF CONTAMINATED SOILS CUBIC METER

An On-Site Safety Officer shall be responsible for evaluating soil with non-natural discoloration, petroleum or chemical odor, the presence of petroleum liquid or sheening on the groundwater surface or any abnormal gas or materials in the ground which are known or suspected to be contaminated with oil or hazardous materials. Soil suspected of gasoline contamination shall be field tested using the jar headspace procedures according to Department of Environmental Protection Bureau of Waste Site Cleanup Interim Policy #WSC-94-400 (Remedial Waste Management Policy for Petroleum Contaminated Soil) and the Bureau of Waste Prevention Policy #COMM-97-001 (Reuse and Disposal of Contaminated Soil and Massachusetts Landfills). The Engineer shall be contacted immediately when any results indicate contamination requiring soil removal or when contamination not detectable by on-site instrumentation is suspected.

The Contractor shall be required to supply all personnel and materials necessary to comply with this section and to support the anticipated levels of protection and monitoring described above.

Within limited areas of the project site, it is likely that excavated soils may be contaminated. Where possible, all soils originally in contact with groundwater will be replaced in the same trench up to the existing groundwater level. All soils determined to be contaminated by metals or petroleum products, through the monitoring/evaluation program will be stockpiled for disposal in accordance with all Massachusetts Department of Environmental Protection statutes, policies, and regulations.

The Contractor shall be responsible for identifying a disposal/recycling facility and obtaining all permits, approvals, Bill of Lading, etc. prior to the removal of the contaminated soil from the site. Any soils contaminated with hazardous materials that are not of petroleum origin shall be handled on a case-by-case basis. All manifest, bills of lading, etc. will be the responsibility of the Contractor with copies provided to the Department. The Licensed Site Professional (LSP) is also responsible for as needed, for oversight and Bills of Lading, etc.

MEASUREMENT AND PAYMENT

The quantity of Item 180.4 MONITORING/HANDLING ANDSTOCKPILING OF CONTAMINATED SOILS shall be measured for payment by the cubic meter of work complete in place and accepted. Work under the item will be paid at Contract Bid Unit Price per CUBIC METER in full compensation for all labor, materials, equipment and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 180.5 LICENSED SITE PROFESSIONAL(LSP) SERVICES HOUR

The Contractor will requisition the services of a Licensed Site Professional (LSP) to provide the services necessary to comply with the requirements of the Massachusetts Contingency Plan (MCP), 310 CMR 40.000, with respect to the scope of work for this Contract. These services will include, but are not limited to, sampling and analysis of potentially contaminated media, preparation of IRA, URAM and RAM Plans, status reports, transmittal forms, release notification forms, completion statements and related documents required pursuant to the MCP. The LSP will be responsible for obtaining all permits related to the characterization, treatment, and disposal of contaminated media. The LSP will provide oversight of handling, stockpiling, re-use, treatment and disposal of contaminated media, including preparation of Bills of Lading, Manifests, and related shipping documents. Environmental technicians, including but not limited to personnel conducting field monitoring and sampling, data interpretation and support services directly related to MCP compliance, are also included in this Item.

The name and qualifications of the LSP will be submitted to the Engineer for review and approval at least two weeks prior to initial site activities. The LSP shall have significant experience in the oversight of MCP activities at active construction sites.

The LSP will coordinate all activities with MassHighway and the Massachusetts Department of Environmental Protection through the Engineer.

The LSP will be responsible for adequately characterizing contaminated media to insure that it meets the requirements of the MCP and, in the case of contaminated media to be disposed of off-site, to insure that it meets the acceptance criteria set forth by the disposal facility. The LSP will be responsible for adequately characterizing subsurface conditions prior to backfill in areas where contaminated soil/sediments are excavated. The cost of laboratory analyses conducted in accordance with the sampling and assessment requirements for compliance with the MCP will be paid for within the unit bid price for Item 180.4 - Monitoring/Handling and Stockpiling of Contaminated Soils and Item 181.1 - Disposal Options for Contaminated Soils.

MEASUREMENT AND PAYMENT

The quantity of Item 180.5 shall be measured for payment by the count of each hour of utilizing services of a team of the LSP and/or any additional environmental technicians to provide the services described above. Work under the item will be paid at Contract Bid Unit Price per HOUR per team in full compensation for the services of the team of a Licensed Site Professional and any environmental technicians, all additional labor, transportation, materials, equipment and expertise required for the work, with exceptions noted above in this item.

ITEM 180.6 MISCELLANEOUS SOIL TESTING EACH

The work under this item shall conform to all relevant provisions of the Standard Specifications, the Special Provisions and the following:

The Engineer may, from time to time, direct the Contractor to obtain soil samples from various locations within the project area and to perform laboratory analyses on those soil samples to assess reuse or disposal options.

SAMPLING AND ANALYSIS

The Contractor shall collect discrete soil sample(s) from locations within individual soil piles or specific land area identified by the Engineer. The soil samples shall be collected at a depth specified by the Engineer. The samples shall be delivered to a Massachusetts certified laboratory using proper chain-of-custody documentation for the analysis of Resource Conservation and Recovery Act (RCRA) 8 metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polyaromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (Method 1311) for metals.

DATA EVALUATION AND REPORT

The Contractor shall review and summarize the laboratory data from the soil sampling analyses. The data will be compared to Massachusetts Contingency Plan (MCP) soil standards and acceptance criteria for soil recycling and landfill disposal facilities. A letter report shall be delivered to the Engineer outlining the soil sampling methods, laboratory analyses results and proposed options for reuse or disposal of the soil.

MEASUREMENT AND PAYMENT

The quantity of ITEM 180.6 MISCELLANEOUS SOIL TESTING shall be measured for payment by the count of each round of samples, which will consist of three samples. Work under the item will be paid at Contract Bid Unit Price per EACH round in full compensation for all labor, materials, equipment and expertise required to collect and test the samples and report to the Engineer.

ITEM 181.1 DISPOSAL OF CONTAMINATED SOILS **MEGAGRAM**

The definitions under 310 CMR 40.0000 are applicable to this item. All work shall be conducted under the supervision of a Licensed Site Professional (LSP) and is to be conducted in accordance with all Massachusetts Department of Environmental Protection statutes, policies and regulations. Reuse is the preferred option.

The LSP shall be responsible for identifying a disposal/recycling facility and obtaining all permits, approvals, Bill of Lading, etc. prior to the removal of the contaminated soil and/or sediment from the site. Any soils and/or sediments contaminated with hazardous materials that are not of petroleum origin shall be handled on a case-by-case basis. All manifest, bills of lading, etc. will be the responsibility of the Contractor with copies provided to the Engineer.

The contractor shall be responsible for the proper disposal or recycling of contaminated soils. The proper methods of disposal and recycling of contaminated soils shall comply with the methods described under Item 180.4.

MEASUREMENT AND PAYMENT

Item 181.1 will be measured for payment in megagram, based on countersigned weight slips, completely removed from the site and delivered to, and accepted by, the landfill, disposal facility, or recycling facility, approved prior to starting the work under this item, which shall be full compensation including the services of a Licensed Site Professional, permits, approvals, sample testing, labor, tools, equipment, transportation, testing, disposal, shipping papers and expertise required to complete the work, with the exceptions noted above under this item.

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS MEGAGRAM

This item shall apply to the disposal of all treated timer and wood products found in the site of the work, suspected to be treated with either creosote, pentachlorophenol and/or CCA. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood to a waste-to-energy facility that is licensed to burn treated wood. The Contractor is required to submit manifests and certificates of destruction to the Engineer prior to completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

MEASUREMENT AND PAYMENT

Measurement and payment shall be by the weight, per megagram, of treated timber removed from the site and subsequently accepted at the waste-to-energy facility, based on countersigned weight slips, completely removed from the site and delivered to, and accepted by, a recycling waste-to-energy facility, approved prior to starting the work under this item which shall be full compensation including permits, approvals, sample testing, labor, tools, equipment, transportation, testing, disposal, shipping papers and expertise required to complete the work.

ITEM 187.3 REMOVAL AND DISPOSAL OF DRAINAGE STRUCTURE SEDIMENTS CUBIC METER

The work under this item shall include removing the accumulated dirt, refuse and other debris, as required by the Engineer, as necessary for the Contractor to perform relevant items of work under this Contract, from designated drainage structures, including the gutter mouth of curb inlets and the outfall of discharge pipes, and disposing of materials removed. Identification of drainages structures requiring sediment removal shall be at the direction of the Engineer.

The cast iron hood shall be removed from all catch basins so equipped, prior to cleaning. Hydraulic lift trucks should be used during drainage structure cleaning operations so that the material can be decanted at the site. After material from several drainage structures along the same system is loaded onto the truck, the truck should be elevated so any free flowing liquid may drain back into the drainage structure. Material must arrive at the disposal facility sufficiently dry to pass the Paint Filter Liquids Test (or no liquid drips from it when a handful is taken and squeezed).

All material removed from the drainage structures and outfalls shall be properly handled and disposed of by the Contractor, and this must be done in accordance with all Massachusetts Department of Environmental Protection (DEP) regulations, policies and guidance. The responsibility for the proper handling and disposal of this material shall be solely the Contractor's.

Material removed from drainage structures shall be transported immediately to the place of disposal in machines or trucks that will not spill the material along the roadway. Any material falling on the roadway shall be removed at the Contractor's own expense.

Catch basin cleanings are classified as a solid waste by DEP and may be disposed of at any landfill that is permitted by DEP to accept solid waste. Materials containing free-flowing liquids are prohibited from being accepted at landfills. The DEP encourages the beneficial reuse of this material whenever possible; however, use not in accordance with DEP determination, or disposal or use as fill in an unapproved location is not acceptable.

It is anticipated that most, if not all, of the material will be landfilled; therefore, the Contractor should be aware that many landfills may require testing and analysis of the material prior to accepting it for disposal at the facility. The Contractor should be aware that, in the event that the test results indicate a hazardous waste that cannot be landfilled, the Contractor shall be responsible for all costs associated with adhering to special regulations regarding the disposal of hazardous waste. The Contractor should take this into consideration in preparing the bid.

ITEM 187.3 (continued)
MEASUREMENT AND PAYMENT

The quantity of Item 187.3 REMOVAL AND DISPOSAL OF DRAINAGE STRUCTURE SEDIMENTS shall be measured for payment by the cubic meter of the sediments, completely removed from the site and delivered to, and accepted by, a landfill facility, approved prior to starting the work under this item.

Prior to transportation offsite, the sediments will be measured in the hydraulic lift truck after decanting. The volume of the sediments will be calculated by approximately determining the height of the sediments in the truck, leveled after completion of decanting, multiplied by the base area of the interior dimensions of the truck.

Work under the item will be paid at Contract Bid Unit Price per CUBIC METER in full compensation for all labor, materials, equipment and expertise required to complete the work, including all costs of removal, delivery and disposal at an approved landfill, disposal facility or recycling facility, the costs for approvals, permits, testing, transportation and other incidental expenses.

ITEM 187.31 REMOVAL AND DISPOSAL OF DRAINAGE PIPE SEDIMENTS METER

The work under this item shall consist of removing the accumulated dirt, refuse and other debris from drainage pipes. Drainage pipes shall be cleaned as directed by the Engineer.

No casting shall be removed until immediately preceding the work and shall be replaced immediately after the cleaning of the drainage pipes is completed. The uncovered catch basin leading to the designated drainage pipes shall not be left unattended at any time.

The provisions of this item are not to be construed that all work be accomplished with equipment. Special conditions such as location, extraordinary shape due to conduits or public utility pipes, or off pavement work, etc., may require hand work.

The material removed from the drainage pipes shall be transported immediately to the place of disposal in machines or trucks that will not spill the material along the roadway. Any material falling on the roadway shall be removed at the Contractor’s own expense.

Hydraulic lift trucks should be used during drainage pipe cleaning operations so that after material from several drainage pipes is loaded onto the truck, the truck can then be elevated so any free flowing liquid may drain back into the drainage structure. Material must arrive at the disposal facility sufficiently dry to pass the Paint Filter Liquids Test (or no liquid drips from it when a handful is taken and squeezed).

ITEM 187.31 (continued)

All material removed from the drainage pipes shall be properly handled and disposed of by the Contractor, and this must be done in accordance with all DEP regulations, policies and guidance. The responsibility for the proper handling and disposal of this material shall be solely the Contractor's. Drainage pipe cleanings are classified as a solid waste by the Massachusetts Department of Environmental Protection (DEP) and may be disposed of at any landfill that is permitted by DEP to accept solid waste. Materials containing free-flowing liquids are prohibited from being accepted at landfills. The DEP encourages the beneficial reuse of this material whenever possible; however, use not in accordance with DEP determination, or disposal or use as fill in an unapproved location is not acceptable.

NOTE: It is anticipated that most, if not all, of the material will be landfilled; therefore, the Contractor should be aware that many landfills may require testing and analysis of the material prior to accepting it for disposal at the facility. The Contractor should be aware that, in the event that the test results indicate a hazardous waste that cannot be landfilled, the Contractor shall be responsible for all costs associated with adhering to special regulations regarding disposal of hazardous waste. The Contractor should take this into consideration in preparing the bid.

MEASUREMENT AND PAYMENT

The quantity of Item 187.31 REMOVAL AND DISPOSAL OF DRAINAGE PIPE SEDIMENTS shall be measured for payment by measuring the length in meter of the pipe cleaned, regardless of the diameter of the pipe. Work under the item will be paid at Contract Bid Unit Price per CUBIC METER in full compensation for all labor, materials, equipment and expertise required to complete the work, including all costs of removal, delivery and disposal at an approved landfill, disposal facility or recycling facility, the costs for approvals, permits, testing, transportation and other incidental expenses.

ITEM 201. CATCH BASIN EACH

The work under this item shall conform to the relevant provisions of Section 201 and the following:

Catch basins shall be precast concrete structures with a 1.2 meter sump as detailed on the Plans. A standard unit shall have a depth of 2.4 meters as measured vertically at the center of the structure from the top of the grating to the top of the floor of the basin.

MEASUREMENT AND PAYMENT

The quantity of ITEM 201. CATCH BASIN will be measured for payment by the count of each. Work under the item will be paid at Contract Bid Unit Price per EACH in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work.

Frame and grate will be paid for under Item 222.1.

ITEM 220.8 SANITARY STRUCTURE REMODELED EACH

Work under this item shall conform to the relevant provisions of Section 220 and the following:

All sanitary structures which are the property of the municipality requiring a change in line or grade or both the line and grade of more than 150 mm shall be remodeled to meet the proposed grade.

Existing castings shall be retained.

MEASUREMENT AND PAYMENT

The quantity of ITEM 220.8 SANITARY STRUCTURE REMODELED will be measured for payment by the count of each. Work under the item will be paid at Contract Bid Unit Price per EACH in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work.

ITEM 222.1 FRAME AND GRATE MHD CASCADE TYPE EACH

Work under this item shall conform to the relevant provisions of Section 220 and the following:

All frames and grates shall have hook lock frames and grates conforming to Standard Construction Drawings 201.6.0 R2, 201.7.0 R2, 201.7.1 R, 201.9.0 R2, 201.9.1 R, 201.10.0 R2 and 201.10.1 R contained in Engineering Directive E-09-003 Hook Lock Grates for Catch Basins, available at http:/www.mhd.state.ma.us.

The Contractor shall determine the number of left and right frames and grates according to the direction of flow and shall provide a list to the Engineer for approval before ordering the castings. The work will be paid at the contract unit price each. No distinction will be made between frames and grates with flow from the left or right.

MEASUREMENT AND PAYMENT

The quantity of ITEM 222.1 FRAME AND GRATE MHD CASCADE TYPE will be measured for payment by the count of each. Work under the item will be paid at Contract Bid Unit Price per EACH in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work.

ITEM 482.3 SAWING ASPHALT PAVEMENT METER

The work under this item shall conform to the relevant provisions of Section 120 of the Standard Specifications and the following:

The work shall include the sawcutting of existing asphalt pavements, and cement/bituminous concrete sidewalks at limits of construction, where shown on the plans and/or as directed by the Engineer.

The existing pavement shall be sawcut through its full depth, at all joints between existing and proposed pavements, and at all utility trenches through existing pavement to remain, to provide a uniform, vertical surface for the proposed pavement joint with the existing pavement.

Sawcut equipment shall be approved by the Engineer prior to commencing work.

Ragged, uneven edges will not be accepted. Sawcut edges that become broken, ragged or undermined as a result of the Contractor's operations shall be edged neatly with a minimum disturbance to remaining pavements or sidewalks prior to the placement of abutting proposed pavement at no additional cost.

Sawcut asphalt surfaces shall be sprayed or painted with a uniform, thin coat of RS-1 asphalt emulsion immediately before placement of bituminous concrete material against the surfaces. Sawcut concrete surfaces shall be thoroughly wetted before placing new concrete.

MEASUREMENT AND PAYMENT

The quantity of ITEM 482.3 SAWING ASPHALT PAVEMENT will be measured for payment in meter. Work under the item will be paid at Contract Bid Unit Price per METER in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work.

ITEM 635.1 HIGHWAY GUARD REMOVED AND DISCARDED METER

The work under this item shall in accordance with the relevant provisions of Section 601 and 630 of the Standard Specifications and the following:

Work under this item shall include discarding unusable guardrail and all appurtenances attached to the existing guardrail (i.e. demountable delineators, termini posts, etc.) as directed by the Engineer. It shall be the Contractor's responsibility to remove and discard the guardrail in a safe manner so that no hazard is made to the public. Post holes shall be filled in.

Guardrail to be discarded will become the property of the Contractor, and will be properly disposed offsite as directed.

MEASUREMENT AND PAYMENT

Item 635.1 will be measured and paid for at the contract unit price per meter, which shall include all labor, materials, transportation, and equipment to complete the work, including all work.

ITEM 657. TEMPORARY FENCE METER
ITEM 657.5 TEMPORARY FENCE REMOVED AMD RESET METER

The work under these Items shall be in accordance with Sections 644 and 665 of the Standard Specifications and the following:

The work shall consist of furnishing, installing, subsequent relocation, if required, and final removal of temporary chain link fence and gates for securing the work site, for protecting groups of trees or as directed by the Engineer. The fence shall be a minimum of 2 meters (6 feet) in height and shall be any type specified in Section 644. All end, corner, gate and intermediate posts shall be driven into the ground and properly supported as outlined in Section 644. Fence post shall not be inserted into the bridge deck. Fence within the bridge shall be installed on top of the temporary concrete barrier. Where temporary chain link fence is required on top of the temporary concrete barriers, the fence posts shall be 60 millimeters (2 3/8 inches) O.D., galvanized Schedule 40 and 1 meter (3 feet) minimum in height. The intent is to prevent access to the work area of the new bridge by unauthorized individuals and to protect the safety of personnel and the general public.

The Contractor shall be responsible for maintenance of the temporary fence and shall be responsible and cognizant that it remains secure and that the area is sealed off to the general public at all times. Fence fabric shall be placed on the face of the post away from the work area. The top edge of the fabric shall be finished with a “knuckled” salvage.

The Contractor shall also furnish and install brightly colored Polypropylene barricade fencing or snow fencing, 50 millimeter by 100 millimeter (2 inches by 4 inches) cladding wired together for protecting trees as shown on the Contract drawings. Fencing shall be a minimum of 1.2 meters (4 feet) high and supported by steel or hardwood stakes spaced at a maximum of 2.4 meters (8 feet) on center or by other means acceptable to the Engineer. Upon completion of the work, or as required by the Engineer, the fencing and supports shall be removed by the Contractor.

The cost for all end, corner, gate and intermediate brace posts as well as gates, brackets and hardware for attaching fence to concrete barrier and all other incidental materials, labor and equipment required for the installation, including concrete foundations if required, relocation and final removal shall be included under the Contract unit bid price per meter. Material need not be new, but shall not be deteriorated, nor in any way jeopardize the security purposes intended. All fencing shall meet the approval of the Engineer.

MEASUREMENT AND PAYMENT

The quantities of ITEM 657 TEMPORARY FENCE and ITEM 657.5 TEMPORARY FENCE REMOVED AND RESET will be measured for payment in meter. Work under these items will be paid at Contract Bid Unit Prices per METER in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work.

ITEM 660.1 TEMPORARY HAND RAIL METER

This work consists of furnishing, installing and removing a temporary steel hand rail on the approaches to the temporary bridge as shown on the Plans and in accordance with the relevant provisions of Section 660.

The hand rail shall be 1.05 meters in overall height and shall be compliant with the AAB/ADA standards. The handrails shall be in pairs, one at a height between 864-965 millimeters and the other one at a height between 460-508 millimeters, measured vertically from the walk surface. The hand rail shall have horizontal bars with an outside diameter between 32-38 millimeters. The vertical bars shall have an outside diameter of 13 millimeters with a maximum space of 100 millimeters between the vertical bars.

The Contractor shall submit shop drawings of the hand rail for approval by the Engineer.

MEASUREMENT AND PAYMENT

The quantity of ITEM 660.1 TEMPORARY HAND RAIL will be measured for payment in meter. Work under this item will be paid at the Contract Unit Bid price per METER, complete in place, and shall include all materials, labor, tools, equipment and incidentals necessary for furnishing, installing and removing the hand rail. Twenty (20) percent of the bid price shall be held till the hand rail is removed.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE METER

The work under this item consists shall conform to the relevant provisions of Section 600, and consists of furnishing and installing geotextile fabric for separation. The fabric shall meet M9.50.0 for separation. The fabric shall be installed in accordance with the manufacturer's recommendations with a minimum overlap of 300 millimeters. Construction equipment shall not travel directly on the fabric.

MEASUREMENT AND PAYMENT

The quantity of ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION will be measured for payment in square meter, complete in place, with no additional compensation for the overlap fabric. Work under this item will be paid at the Contract Unit Bid price per SQUARE METER, and shall include all materials, labor, tools, equipment and incidentals necessary for the installation of the fabric.

ITEM 701.11 HISTORIC STONE WALL AND GARDEN PRESERVATION LUMP SUM

The purpose of this item is to provide for the preservation of the historic stone wall at 115 High Street, alternatively referred to as the Baker-Sutton House, and the reconstruction of any part of the wall and garden that is disturbed for construction. Protection and restoration shall be coordinated with the Ipswich Town Planner and the MassHighway Landscape Architect.

The Contractor shall control the construction activities not to disturb the layout of the existing stone wall.

The Contractor shall employ masons and other craftsmen with at least 5 years demonstrated experience in the construction of dry laid stone masonry for the work of disassembly and reassembly of the Stone wall under this item of work. The Contractor shall submit to the Engineer for approval the name of the stone wall subcontractor.

SUBMITTALS

Prior to the start of work, the Contractor shall inspect the stone wall and shall photograph the wall and from all sides with a surveyor's rod to record dimensions with conditions. The Contractor shall retain the services of a registered landscape architect with demonstrated experience in historic landscape restoration to generate a scaled Shop Drawing showing the wall, including limits of the wall and garden to be disturbed. The shop drawing shall also show the existing garden, including cobble path, that will be disturbed by construction. The drawing shall show existing conditions and the proposed location of the relocated wall.

Shop drawings shall be approved by the Engineer prior to any work

In addition, the contractor shall identify which portions of the wall will be affected by construction activities.

WALL AND GARDEN PRESERVATION

For wall and garden that will not be disturbed, provide plastic fencing with steel garden fence stakes, or methods approved by the Engineer. Fencing shall adequately separate construction activities from the garden and wall and shall ensure pedestrian access as desired by the property owners. Maintain protective fencing during all construction activities.

ITEM 701.11 (Continued)

WALL, PATH, AND GARDEN DISMANTLING

For wall that will be relocated, after documentation and approval by the Engineer, the Contractor shall disassemble the portion of the wall and path cobbles to be disturbed, and shall store stones in a protected location agreed to by the owner and the Engineer. Stones shall be retained by the owner for reuse in the reconstruction of the wall and path. Stones shall be handled and stored in such a way that they will not be damaged.

The Contractor shall photographically document any base material supporting the stone wall and path.

Contractor shall relocate all shrubs and perennials as directed by the Engineer.

RECONSTRUCTION

At the conclusion of the road and sidewalk construction activities in the vicinity and at the direction of the Engineer, the Contractor shall stake for approval the revised alignment of the reconstructed stone wall, cobble path, and garden replanting.

The restored wall shall be located in such a way as to ensure a continuous curve that retains as much of the original garden as possible. The face of the wall shall be located sufficiently set back from the curb to ensure a minimum of 1.5 meters (4 feet) from the back of the curb of the new sidewalk. If necessary, new sidewalk may need to be saw cut to optimize the position of the wall. Sawcutting of sidewalk to accommodate the wall shall be incidental to this item.

Using the existing wall, shop drawings, and the documentation photos as guide, Contractor shall reconstruct sufficient portion of the wall as a sample for approval prior to completion of the wall. Stones shall be the original stones. Visual quality of completed wall shall be consistent with existing wall and with portions of undisturbed wall, matching dimensions, voids, and stacking pattern. Handling of stones shall ensure no damage or disfiguring of reconstructed stones.

Using salvaged path cobble stones the contractor shall restore the cobblestone path to the outer edge of the relocated stone wall.

Plants shall be relocated as shown on the shop drawing.

Engineer may request reconstruction of wall, path or garden if it does not meet desired location and appearance.

Plantings shall be guaranteed per the requirements of the Standard Specifications.

ITEM 701.11 (Continued)

MEASUREMENT AND PAYMENT

The Item 701.11 HISTORIC STONE WALL AND GARDEN PRESERVATION is a lump sum item consisting of well defined construction procedures as stated above. Work under the item will be paid at Contract Bid Unit Price per LUMP SUM in full compensation for all labor, transportation, materials, equipment, expertise and skill required to complete the work, to be paid with the following breakdown:

- Twenty percent (20%) of the Lump Sum price will be paid upon completion of photographic documentation and installation of all protective measures,
- Forty percent (40%) at negotiated midpoint of construction,
- Forty percent (40%) upon completed reconstruction of the stone wall.

All payments are subject to retainage.

ITEM 701.2 CEMENT CONCRETE WHEELCHAIR RAMP SQUARE METER

The work under this item shall conform to the relevant provisions of Section 701 and the following.

Detectable warning panels shall be installed as shown on the Plans and as detailed in Construction Standards M/E 107.2.1R and M/E107.6.5R dated December 2004.

The tile shall conform to Americans with Disabilities Act (ADA) requirements.

The cost for furnishing and installing detectable warning panels to ADA requirements shall be considered incidental to this item.

MEASUREMENT AND PAYMENT

The quantity of Item 701.2 CEMENT CONCRETE WHEELCHAIR RAMP will be measured for payment in square meter, complete in place. Work under this item will be paid at the Contract Unit Bid price per SQUARE METER, and shall include all materials, labor, tools, equipment and incidentals necessary for completion of the item of work.

ITEM 706.1 BRICK WALK REMOVED AND RELAID SQUARE METER

This work shall consist of removing an area of brick walk, stacking brick and relaying them after the slope work is completed.

The bricks are to be removed carefully so that they are not damaged. They are to be stacked and protected by the Contractor until they are ready for reuse. The bricks shall be relaid in the same type base material as they were removed from. They shall be tamped so they set firmly and flush to the surrounding ground surface.

MEASUREMENT AND PAYMENT

The quantity of Item 706.1 BRICK WALK REMOVED AND RELAID will be measured for payment in square meter, complete in place. Work under this item will be paid at the Contract Unit Bid price per SQUARE METER, and shall include all materials, labor, tools, equipment, expertise and skill in removing, stacking and relaying bricks, bedding material, cement concrete base and incidentals necessary for completion of the item of work.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

Work under this item shall conform to the relevant provisions of Section 740 and the following:

Twelve three ring binders, one inch thick with clear covers and side pockets shall be provided and become the property of the Department.

A computer systems and a digital camera meeting the requirements set forth below and including installation, maintenance, power, paper and other supplies shall be provided at the Resident Engineer's Office:

The computer system shall consist of the following or better:
Case:.....Small form factor, internal DVD drive, external or internal speakers
CPU:.....Intel Core 2 Quad
RAM: .....2 Gb of 800 MHz DDR2
Video:.....DVI capability to supplied LCD monitor
Hard disk:.....500GB, 7200RPM
Monitor: .....19" 1280x1024 LCD, TFT, Height adjustable stand, DVI
DVD-RW/CD-RW:.DVD-RW 20X speed or better, 50 DVD-R 16X disks
Network Adapter: ...10/100 Mbit/s
USB Ports: .....8 high-speed USB ports
Modem:.....Cable/DSL with 4-Port Ethernet Router or 56K/V.90 (if using dial-up internet service)

ITEM 740. (continued)

Mouse: .....Optical mouse with scroll
Keyboard:.....Standard 104-key
Printer: .....Color laserjet printer to be shared by all computers
OS: .....Windows XP Professional SP3 with all current security updates (Later versions of Windows are not supported by MassHighway Applications.)
Web Browser: .....Internet Explorer 6.0 with all current security updates (Later versions of Internet Explorer are not supported by MassHighway Applications.)
Office: .....MS Office Professional with all current security updates
Flash drives: .....3 - 8GB USB micro SD card readers, each with 2GB micro SD card

The digital camera shall meet the following minimum criteria or better:
Manufacturer:.....Olympus, Nikon, Canon or approved equal
Resolution: .....5 Megapixel
Optical Zoom: 5X
Memory:.....2GB micro SD card (included)
USB Port: .....USB 2.0 with PC cable
Screen: .....2-inch LCD with scratch-resistance and anti-reflectance
Battery Power: .....2 sets of batteries with battery charger
AC Power:.....AC adapter
Carrying Case: .....Rain-proof with shoulder strap
Internet access: High speed broadband via connection card or other approved method.

The Engineer's Field Office and the equipment included therein, including the computer system and camera shall remain the property of the Contractor at the completion of the project. The disks and card readers with cards shall become the property of the Department.

ITEM 773.037	**PINE – AUSTRIAN 1.73 – 2.44 METERS HEIGHT**	**EACH**
ITEM 774.038	**SPRUCE – COLORADO GREEN 1.73 – 2.44 METERS HEIGHT**	**EACH**
ITEM 775.028	**ELM – AMERICAN 'PRINCETON' 50-60 MM CAL**	**EACH**
ITEM 776.841	**MAPLE – SUGAR – 'GREEN MOUNTAIN' 50-60 MILLIMETER CALIPER**	**EACH**
ITEM 777.036	**OAK – NORTHERN RED 50-60 MILLIMETER CALIPER**	**EACH**
ITEM 777.241	**OAK – SCARLET 50-60 MILLIMETER CALIPER**	**EACH**
ITEM 781.173	**HACKBERRY TREE 50-60 MILLIMETER CALIPER**	**EACH**
ITEM 781.268	**HAWTHORN – 'WINTER KING'1.73 – 2.44 METERS HEIGHT**	**EACH**
ITEM 782.535	**EASTERN REDBUD 1.73 – 2.44 METERS HEIGHT**	**EACH**
ITEM 783.509	**SERVICEBERRY 'AUTUMN BRILLIANCE' 40-50 MILLIMETER CALIPER**	**EACH**
ITEM 785.736	**INKBERRY 610-760 MILLIMETERS**	**EACH**
ITEM 789.333	**BAYBERRY SHRUB – NORTHERN 610-900 MILLIMETERS**	**EACH**
ITEM 790.633	**DOGWOOD – REDOSIER 610-900 MILLIMETERS**	**EACH**
ITEM 791.016	**VIBURNUM – BLACKHAW NO.3**	**EACH**
ITEM 791.066	**EASTERN NINEBARK 610-760 MILLIMETERS**	**EACH**
ITEM 792.022	**HYDRANGEA-OAKLEAF NO. 2**	**EACH**
ITEM 795.013	**VIBURNUM – ARROWWOOD 900 MM – 1.22 METERS**	**EACH**
ITEM 795.033	**VIBURNUM – DOUBLEFILE 900 MM – 1.22 METERS**	**EACH**
ITEM 796.071	**VIRGINIA CREEPER NO. 1**	**EACH**

The work under this item shall conform to the applicable requirements of Section 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the Standard Specifications, except as amended and supplemented as indicated on the drawings and as specified below.

For the above items the Contractor shall provide and install plant material of genus, species, variety, size and quantities in locations as directed by the Engineer. The work of this section includes, but is not limited to, the following:

A. Purchasing and transporting plant material to construction sites
B. Installation of plant material
C. Plant care during 60-day Maintenance Period and one-year Establishment Period
D. Replacement of defective or dead plants at End of Maintenance Period
E. Replacement of defective or dead plants at End of Establishment Period

The Landscape Contractor shall have five years continuous experience and expertise in management, handling and installation of ornamental plant material in large scale landscape construction projects. Site foreman shall have at least five years experience and shall be on-site during all times of plant installation.

ITEM 773.037 through 796.071 (continued)

SAMPLES AND SUBMITTALS

Plant Material: At least 180 days prior to anticipated planting, the Contractor shall submit a confirmation of availability for all plants on the list, accompanied by nursery sources. When the specified types and sizes of plants are not available, substitutions may be made upon request by the Contractor, if approved in writing by the Engineer. Substitutions proposed by the Contractor shall have equivalent overall form, height, and horticultural characteristics and must be approved in writing by the Engineer prior to tagging. At least 30 days prior to planting, the Contractor shall submit a schedule for tagging material to the Engineer.

For all other materials, at least 30 days prior to ordering, the Contractor shall submit to the Engineer material specifications and (where applicable) installation instructions attesting that the following materials meet the requirements specified. No materials shall be ordered until submittals have been approved by the Engineer. Delivered materials shall match the samples.

All material samples shall include supplier's literature and certification that material meets specifications. Submittals, including samples, material specifications, and installation specifications are as follows

Fungal mychorrhizae: Submit sample with supplier specifications and certification.

Loam: The Contractor shall submit two 4-kilogram samples of loam to be used as backfill per the requirements of Section 751 of the Standard Specifications, accompanied by laboratory certified test results per the requirements of Section 751.

Backfill Mix: The contractor shall submit a 4 kilogram representative sample of existing soil, which shall then be mixed with loam and tested according to the requirements specified herein. Mixing shall be done in the presence of the Engineer.

Water: Submit a watering schedule, including sources of water, methods of irrigation, and any incidental work required to provide water for the plants.

Testing Methods: The Contractor shall submit to the Engineer for his inspection and approval, equipment and methods for testing soil moisture and soil pH.

ITEM 773.037 through 796.071 (Continued):

The Contractor shall provide to the Engineer two new functioning moisture gauges, including instructions for use and batteries if required, for his use during the duration of the Contract. The meters shall be hand held, and shall be capable of measuring moisture at a depth of 150 millimeters. Meter scale shall be sufficient to determine moist, dry, or wet soil. The meters shall be regularly checked for calibration against watered loam, and shall be replaced if found faulty at no additional cost.

In addition, the Contractor shall provide to the Engineer one copy of the "American Standard for Nursery Stock," ANSI Z-60.1, latest edition, published by American Association of Nurserymen (AAN) for the duration of this Contract.

REFERENCES AND STANDARDS

The following standards shall apply to the Work of this Section.

ASNS: "American Standard for Nursery Stock," ANSI Z-60.1, latest edition, published by American Association of Nurserymen (AAN).

Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses. Michael Dirr. Stipes Publishing Company, latest ed.

EXAMINATION OF CONDITIONS

The Contractor shall be responsible for judging the full extent of work requirements involved.

This responsibility includes, but is not limited to, the following: transportation, purchase, temporary storage and maintenance of plants; plant rehandling prior to final installation; removal and off-site disposal of existing loam determined by the Engineer to be unacceptable; purchase, transport, and supply of loam.

MATERIALS

Plant Materials

The Contractor shall furnish all plants as shown on the plans, unless otherwise directed in writing by the Engineer. All plants shall be nursery grown.

All plants shall be legibly tagged with the botanical name. Only plant stock grown within hardiness Zones 1 through 6a, as established by the USDA Plant Hardiness Zone Map, will be accepted. The Contractor's suppliers must certify in writing that the stock has actually been grown under Zone 6a or hardier conditions. Plants not so certified will not be accepted.

ITEM 773.037 through 796.071 (Continued):

All plants shall be typical of their species or variety in growth habit. Plant sizes, habit, rootballs, and containers shall be in accordance with the American Standard for Nursery Stock (ASNS), Standards of the American Association of Nurserymen (AAN) as a minimum requirement for acceptance.

All plants must be moved with the root systems in soil. Balled and burlapped plants shall be wrapped with untreated 225 gram (8 ounce) burlap, firmly held in place by a stout cord. Wire containers shall be of sufficient size to allow root development for the plant size, per ASNS requirements. Plants prepared with plastic or other non-biodegradable wrappings will not be accepted. Rootballs shall remain intact during all operations. No plant will be accepted if the rootball has been badly cracked or broken prior to, or during, the process of planting. Rootballs shall be moist upon arrival and shall be kept moist until installation. All balled and burlapped plants that cannot be planted at once must be heeled in by setting them in the ground, covering the rootballs with soil, and watering them adequately.

Container-grown stock shall have been grown in the container long enough for the root system to have developed sufficiently to hold its soil together firmly. No plants shall be loose in the container. Container-grown plants shall not be pot bound, with spiraling roots or roots growing densely against the sides of the container. Score or butterfly cut rootball of all container-grown plants prior to planting.

Each plant shall have plenty of fibrous roots, healthy buds, and shall be free of disease or insect pests, eggs or larvae. All plant parts shall show active green cambium when cut. They shall be densely foliated when in leaf.

The trunk of each tree shall be free from sun scald, frost cracks, or wounds resulting from abrasions, fire or other causes. Pruning wounds shall be no larger than 50 millimeters and shall show vigorous scar tissue. No trees with double-leaders or twin-heads will be acceptable without the written approval of the Engineer. No plant material from cold storage will be accepted. In regards to shrubs, no single stemmed or thin plants will be accepted. The side branches must be generous and well-twigged, and the plant as a whole must be well-branched to the ground. The plants must be in a vigorous condition, free from dead wood, bruises or other root or branch injuries.

LOAM BORROW

Loam borrow, sometimes referred to as loam, for planting soil mix shall be in accordance with the requirements of Standard 751 of the Standard Specifications.

ITEM 773.037 through 796.071 (continued)

SOIL AMENDMENTS

Soil amendments, including ground limestone, sulfur, gypsum, and organic materials, shall meet the requirement of Loam Borrow, as described herein.

PLANTING SOIL MIX

Planting soil for backfill shall be a mixture of equal parts approved loam and excavated material. Mixed material shall be pH tested by the Contractor in the presence of the Engineer, and adjusted according to particular planting applications, using lime or sulfur as required. For plants that require an acid soil, such as ericaceous plants and broad-leaved evergreens, planting soil shall have a true pH of 4.5 to 5.5. Planting soil for all other plants shall have a true pH value of 6.0 to 6.5. Proposed soil amendments shall be submitted to the Engineer for approval prior to application.

BARK MULCH

Bark mulch shall be shredded pine bark aged a minimum of six (6) months. The mulch shall be dark brown in color, free of chunks and pieces of wood thicker than 6 millimeters and shall not contain, in the judgement of the Engineer, an excess of fine particles. Unless otherwise specified in these special provisions, bark mulch shall be incidental to the cost of the planting items. Do not use wood chips.

WATER

The Contractor shall be responsible for furnishing his own supply of water to the site at no extra cost. All plants injured or damaged due to the lack of water, or due to the use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation.

FUNGAL MYCORRHIZAE

Each plant shall be planted with fungal mycorrhizae. Mycorrhizae shall include at least three species of vesicular arbuscular (endomycchorizal) fungi as well as ectomycorrhizal fungi. Mycorrhizae shall be shipped in individual dosage packets.

CONSTRUCTION METHODS

Furnishing and planting of plant material shall include, but is not limited to, the following: digging of the pits and plant beds; amendment of loam as required to produce planting soil mix; provision of soil additives for pH requirements of specific plants; provision of mycorrhizal fungi; furnishing the plants as specified; plant installation; watering and maintenance.

ITEM 773.037 through 796.071 (continued)

SEASONS FOR PLANTING

Spring: Deciduous materials - March 21 through May 1
Evergreen materials - April 15 through June 1

Fall: Deciduous materials - Oct. 1 through Dec. 1
Evergreen materials - Aug. 15 through October 15

Requests for exceptions to this schedule shall be submitted in writing to the Engineer for his approval.

PLANT TAGGING AND APPROVAL

The Contractor shall locate, secure, tag, and ship plant material in a sufficiently timely manner to ensure minimal substitution and storage of plants.

Plants shall be tagged at least one month prior to the expected planting date. The Contractor shall be responsible for tagging the material at the nursery and providing a representative. The Contractor shall request that the Engineer provide a representative to approve tagged stock to be planted under this Section. Contractor shall tag or allow the nursery to tag material for approval of the Engineer's representative. In the event that satisfactory material cannot be located, the Contractor shall be responsible for any necessary travel and overnight accommodations for the Engineer's representative during the period of time required to locate, select, and approve plant material.

All trees and a representative sample of each shrub species on the Plant List shall be tagged by the Contractor at the nursery and approved by the Engineer or his representative, prior to digging, for conformity to specification requirements as to quality, size, and variety. Cost of replacement of materials rejected by the Engineer at the site shall be borne by the Contractor.

Approval of tagged material at the nursery shall not prevent the right of inspection and rejection upon delivery at the site or during the progress of the work.

Tree trunks shall be protected during shipping by a heavy walled cardboard sleeve or other suitable material. Plants shall either be shipped in enclosed trucks or all surfaces, leaves and branches shall be wrapped to prevent damage and dessication.

ITEM 773.037 through 796.071 (continued)

PLANT DELIVERY AND INSTALLATION

Locations for all plants shall be approved by the Engineer before any plant pits or plant beds are dug.

The Contractor shall locate all underground utilities within 4 meters of the proposed planting pits and notify the Engineer of any conflicts prior to digging plant pits.

The Contractor shall notify the Engineer 3 working days prior to the proposed arrival of plant material on the site. All plants shall be planted within 5 days of arrival on site or shall be rejected by the Engineer. Plants stored on site shall be shaded from direct sunlight at all times and shall not be stored on paved surfaces. Plants stored on site shall be watered daily.

PLANTING

Prior to the installation of any plant material, the Contractor shall dig test pits to determine percolation rates. Percolation of less than 25 millimeters per hour shall require corrective measures as recommended by the Contractor and approved by the Engineer.

Plant pits shall be excavated as shown on plans and the sides scarified to prevent glazed soils.

Trees and shrubs shall be placed as shown on the plans, with the root crown exposed above finished grade. After placement of balled and burlapped plants and prior to backfilling, remove all rope, wire baskets and burlap from the root balls. For container material, remove pots just before planting, and loosen the perimeter roots and soil before placement. Handle plants carefully to prevent damaging roots or stems.

Add mycorrhizal fungi per manufacturer specifications. After planting, the Contractor shall submit fungi dose packets to the Engineer to certify installation of material.

Prepare planting soil mix as specified above to depths as shown on the drawings. Place backfill mix in layers of not more than 150 millimeters, and water each layer sufficiently to settle soil before the next layer is put in place. Backfill mix shall meet finished grade after settlement. Shape edge of planting pit to form a saucer for holding water and place mulch as shown in the plans. Do not cover the stem flare of the plants with mulch.

Water plants immediately following planting as necessary to thoroughly moisten rootball and planting soil.

ITEM 773.037 through 796.071 (continued)

Plants shall not be wrapped after installation. Wounds shall not be painted. Trees shall not be staked unless wind or other local conditions require the additional protection. Staking and guying shall be incidental to tree installation. Use cloth tape rather than wire. The Contractor shall be responsible for removing all staking and guying materials at the end of the Maintenance Period.

PLANT CARE

Contractor shall provide plant care for the duration of the Maintenance and Establishment periods

Adequate watering is essential to plant care. During the 60 day Maintenance Period, plants shall be inspected for watering needs at least twice each week using moisture meters supplied by the Contractor. In addition, during the portion of the Establishment period occurring between May 1 and October 1, the plants shall be inspected weekly using moisture meters.

Plant care shall consist of keeping the plants in a healthy growing condition. Plant care shall include watering, weeding, pruning, re-mulching, removal of dead material, resetting plants to proper grades or upright position, and maintaining the planting saucer.

Trees and shrubs shall be pruned, if necessary, following planting and in accordance with the American Nurserymen's Association Standards for Class I, fine pruning, to preserve the natural character of the plant. All dead wood or suckers and all broken or badly bruised branches shall be removed. Do not cut leaders.

Any decline in the condition of new plantings shall require the Contractor to take immediate action to identify potential problems and undertake corrective measures. If required, the Contractor shall engage professional arborists and/or horticulturists to inspect plant materials and to identify problems and recommend corrective procedures. The Engineer shall be immediately advised of such actions. Inspection and recommendation reports shall be submitted to the Engineer.

Absolutely no debris may be left on the site. The Contractor shall repair any damage to site as directed by the Engineer, at no additional cost.

ITEM 773.037 through 796.071 (continued)

MAINTENANCE PERIOD: 60 DAYS

The Maintenance Period shall begin immediately after each plant is planted and shall continue for a minimum of 60 days following the completion of all planting installations, or until the Conditional Acceptance of all planting work, whichever is a longer period of time.

At the end of the Maintenance Period, the Contractor will request inspection by the Engineer at least 10 days before the anticipated date of inspection.

At the time of inspection, if the plant materials and workmanship are acceptable to the Engineer, the Engineer shall issue a written Certificate of Conditional Acceptance to the Contractor. The date of the inspection shall establish the end of the Maintenance Period and the commencement of the required one year establishment period for planting work.

If in the Engineer's opinion, plant materials and/or workmanship is deficient, acceptance will not be granted, and the Maintenance Period for all the plants shall be extended until plant replacements are made or other deficiencies are corrected. All dead and unsatisfactory plants shall be removed promptly from the project. Replacement plants shall conform in all respects to the Specifications for the original plants and shall be planted in the same manner.

ESTABLISHMENT PERIOD: ONE YEAR

The purpose of the Establishment Period is to nurture plants through at least one full growing season and one full winter. All plants shall be inspected by the Engineer one year after Conditional Acceptance and shall be alive and in satisfactory growth at the end of that time. The Contractor is responsible for arranging inspection early enough in the season to allow adequate time to procure and install replacement material.

At the end of the Establishment Period, each plant shall show healthy growth on at least 75 percent of its terminal stems, as determined by the Engineer. Determination of healthy growth shall include, but is not necessarily limited to, viable leaves (in season) and terminal buds, as well as live cambium. Plants found to be unacceptable shall be removed promptly from the site and replaced immediately or during the next normal planting season, as permitted by the specifications.

ITEM 773.037 through 796.071 (continued)

Planted areas shall be free of weeds and debris, and plantings shall be remulched as necessary. The Engineer will inspect the replacement planting work upon the request of the Contractor. Request for inspection shall be received by the Engineer at least ten days before the anticipated date of inspection.

Stakes and guying, if any, shall be removed from all plants before Final Acceptance.

Upon acceptance of the work of replacement planting, the Engineer shall issue a written Certificate of Final Acceptance for all plants installed under this Section to the Contractor.

MEASUREMENT AND PAYMENT

The quantity of plants, trees and shrubs listed above in Items 773.037 through 796.071 will be measured for payment by the count of each after satisfactory completion of the Maintenance Period. Work under these items will be paid at Contract Bid Unit Prices of these items per EACH in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work, including plant pit excavation, soil preparation, soil amendments, planting mix preparation, loam for planting mix, mycorrhizal fungi planting, plant protection, bark mulch (including placement), watering, maintenance, disposal of unsuitable soils, and all other incidentals required for furnishing and installing the plantings in accordance with the drawings, and as directed by the Engineer.

ITEM 820.151 TEMPORARY LIGHTING LUMP SUM

The work under this item shall conform to the relevant provisions of Section 820 of the Standard Specifications and the following:

Work under this item shall include the furnishing, installing and removing temporary street lighting for High Street to replace the street lights that are removed for the construction of the project. The Contractor shall be responsible for maintaining an operational lighting system on the sections of roadway open to vehicular and pedestrian traffic during all phases of construction. Any temporary work necessary to maintain an operational system shall be included in the cost of this item

Temporary lighting equipment includes, but is not limited to poles, bracket arms, lamps, and necessary wiring to make the system totally operational. The Contractor shall coordinate his activities with Ipswich Municipal Light Department for available power supplies.

The lighting system shall meet the following illumination requirements- an average of 1.6 footcandles and an average to minimum uniformity ratio of 3 to 1.

The Contractor must supply to the Ipswich Municipal Light Department a plan showing the post spacing, luminaire type and wiring configuration for approval. Lighting levels shall be a minimum of 1.6 foot-candles with a uniformity ratio of 3:1 to 4:1.

Under NO CONDITIONS shall any affected area be left without lighting for any period of time.

MEASUREMENT AND PAYMENT

The Item 820.151 TEMPORARY LIGHTING is a lump sum item consisting of furnishing, installing and removing temporary street lighting as defined above. Work under the item will be paid at Contract Bid Unit Price per LUMP SUM in full compensation for all labor, transportation, materials, equipment, expertise and skill required to complete the work, to be paid with the following breakdown:

- Sixty percent (60%) of the Lump Sum price will be paid for installation,
- Thirty percent (30%) to maintain and pay for electricity during construction,
- Ten percent (10%) upon completion of temporary lighting removal

All payments are subject to retainage. No separate payment will be made for utility company work order charges, engineering costs, controllers, light poles, foundations, wiring and luminaries, but all costs in connection therewith shall be incidental to the Contract Bid Unit Price.

ITEM 850.41 ROADWAY FLAGGER HOUR

The Contractor shall provide the number of flaggers required in either the appropriate Traffic Control Plan (TCP) template (see MassHighway's website at http://www.mhd.state.ma.us/) or that the Engineer deems necessary for the direction and control of traffic within the site. A flagger shall be used as directed by the Engineer in accordance with 701CMR 7.00, this section, and the TCP. Any flagger determined by the Engineer to be ineffective in controlling traffic may be removed at the discretion of the Engineer. If a flagger is directed to be removed, the Contractor shall immediately comply with the directive from the Engineer and shall suspend operations as necessary until a qualified replacement can be provided. Such a suspension of operations shall not be considered as a basis for a claim or an extension of time.

Flaggers used during the performance of the Work shall be at least eighteen years of age.

Flaggers used during the performance of the Work shall possess a current certificate of satisfactory completion from a Department-approved flagger training program within the previous two years. Prior to the start of work, the Contractor shall provide to the Engineer a written list of certified flaggers to be used, including the most recent date of certification or re-certification for each person listed. All flaggers shall carry their approved flagging training program certification card with them while performing flagging duties. Flagger certifications shall remain valid for the duration of the project or the flagger shall be removed from the project.

Flaggers used during the performance of the Work shall have completed a First Aid training course according to the standards and guidelines of the American Heart Association or the American Red Cross. Flaggers shall carry their First Aid certification cards with them while performing flagging duties. First Aid certifications need not be renewed once the initial certification has expired.

Each flagger shall be equipped with the following high visibility clothing, signaling, and safety devices:

(1) A white protective hard hat with a minimum level of reflectivity per the requirements of ANSI, Type I, Class E&G;

(2) A clean, unfaded, untorn lime/yellow reflective safety vest and safety pants meeting the requirements of ANSI 107 Class 3 with the words "Traffic Control" on the front and rear panels in minimum two (2) inch (50 millimeter) high letters;

(3) A 24 inch "STOP / SLOW" traffic paddle conforming to the requirements of Part 6E.03 of the Manual on Uniform Traffic Control Devices (MUTCD), a weighted, reflectorized red flag, flagger station advance warning signage, and two-way radios capable of providing clear communication within the work zone between flaggers, the Contractor, and the Engineer. The traffic paddle shall be mounted on a pole of sufficient length to be seven feet above the ground as measured from the bottom of the paddle;

ITEM 850.41 (continued)

(4) A working flashlight with a minimum of 15,000 candlepower and a six inch red attachable wand, a whistle with an attached lanyard, and a First Aid kit that complies with the requirements of ANSI Z308.1.

(5) An industrial/safety type portable air horn that complies with the requirements of the U.S. Coast Guard.

Compensation for flaggers will be paid on an hourly basis for only the actual time spent flagging and payment will be made under Item 850.41, Roadway Flagger. No allowance or additional payment will be made for required training, equipment, travel time, transportation, or any administrative charges associated with the costs of flaggers.

ITEM 853.36 TEMPORARY CONCRETE BARRIER ON BRIDGE (SINGLE FACED METER

ITEM 853.36 TEMPORARY CONCRETE BARRIER ON BRIDGE (REMOVED AND RESET METER

The work under these items shall include the furnishing, installing, removing, resetting, and final removal of the temporary precast concrete barriers on the bridge deck. The temporary barriers shall be in accordance with the details shown on the Plans. The work shall also include furnishing and installing all hardware and materials necessary to attach the barriers to both the existing and proposed concrete decks and filling the holes in the proposed deck after the barriers have been removed.

The drilling of holes and resin bonding of bolts for the anchorage of temporary single face barriers shall be considered incidental to items 853.36 and 853.37.

MATERIALS

The precast cement concrete shall conform to Section 629 of the Standard Provisions and the details shown on the Plans.

The bolts shall be 25.4 mm in diameter and shall have strengths that, as a minimum, meet ASTM A325. The bolted anchorage system as resin bonded into the deck concrete must have been successfully crash tested and accepted in accordance with the evaluation criteria for a TL-4 railing, as defined in the NCHRP Report 350. The substitution of non-crash tested systems shall not be allowed.

The bonding material used to secure the bolts to the deck shall be a resin adhesive and must successfully pass field-testing as defined below prior to acceptance for use on this project.

BOLTING

High Strength Bolts shall be installed through pockets formed in the barriers and bonded in holes drilled in either the existing or proposed concrete deck. The bolts shall be suitably coated to facilitate removal from the mating threads of the cured resin adhesive once the barriers are no longer needed. The process of removing the bolts shall cause no distress to the proposed deck concrete.

The bolt embedment length and resin adhesive must be adequate to develop a minimum of 160 kilonewtons of tension in the bolts. The embedment length shall not be less than 165 mm in concrete and shall not extend below the bottom of the proposed deck.

The details of the proposed bolted anchorage system and all installation and removal procedures shall conform to the recommendation of the manufacturer and shall be submitted to the Engineer for approval.

ITEM 853.36 & 853.37 (continued)

FIELD TESTING

Field tests shall be performed to verify the effectiveness of the drilled hole diameter, embedment length, and the resin adhesive capacity. Two test bolts in both the existing concrete and the new concrete shall be installed and tested by the Contractor for pullout. The bolts shall be pulled 160 kilonewtons tension to verify the required capacity. If the desired strength is not achieved, the Contractor must adjust the hole size, embedment length, bolt size, and/or adhesive material to meet this test requirement. All testing shall be performed by the Contractor and is incidental to the work under this Item. The method of applying the tension test load to the bolts shall conform to ASTM E488. The testing equipment used and the locations and details of the test bolts shall be submitted to the Engineer for approval. The Contractor shall perform this test as soon as possible in order to eliminate delays in construction due to the approval process. Bolts shall not be ordered until the embedment lengths have been approved.

CONSTRUCTION METHODS

The contractor shall ensure that the deck reinforcement will not be damaged during the installation of the proposed barrier anchor bolts. Any damage to the deck reinforcement that occurs during the course of the Contractor's operations shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

Impact or percussion drills are allowed if no distress occurs to the existing concrete. Their use is subject to the approval of the Engineer. Diamond core or electric hammer drills shall not be used.

Any damage to the existing to remain or the proposed concrete shall be repaired to a condition equal to or better than prior to the beginning of these operations and shall be at the Contractor's expense.

All holes shall be blown clear of any debris prior to placement of resin. The Contractor shall have the approval of the Engineer signifying that the holes are clean prior to placing the resin adhesive.

The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the adhesive material prior to the placement of the bolts. The Contractor shall not place adhesive material when the existing concrete temperature is below 4°C.

Any excessive resin adhesive around the hole after placement of the bolt shall be struck off smooth while the resin adhesive is still fresh. After the bolts have been removed from the barrier, anchorage holes in the new reinforced concrete deck shall be completely filled with the same resin adhesive. The top of the resin adhesive shall be finished smooth and flush with the surrounding deck surface.

ITEM 853.36 & 853.37 (continued)

The Contractor shall have no claim for extra compensation for any variations in the diameter of the hole, the embedment length, the method of producing the hole, or the type of adhesive used in anchoring the proposed barriers.

DELINEATORS

The work under this item shall also include the furnishing of delineators to be attached directly to the temporary precast concrete median barriers. The delineators shall be single units, with yellow lenses on both sides, placed 150 mm below the top and on the traffic side of the median barrier at 6 meters on center.

Delineators shall be the type designed expressly for this type of attachment and may be made entirely of plastic.

MEASUREMENT AND PAYMENT

The quantities of ITEM 853.36 TEMPORARY CONCRETE BARRIER ON BRIDGE (SINGLE FACED) and ITEM 853.37 TEMPORARY CONCRETE BARRIER ON BRIDGE REMOVED & RESET will be measured for payment in meter. Work under these items will be paid at Contract Bid Unit Prices per METER in full compensation for all labor, materials, hardware, tools, transportation, equipment and expertise required to complete the work. The Contract Bid Unit Prices shall also include removing, resetting, and bolting the temporary barriers, and the final removal and transportation of the barriers.

ITEM 853.42	**TEMPORARY IMPACT ATTENUATOR FOR SHOULDER, CAPABLE OF REDIRECTION**	**EACH**
ITEM 853.421	**TEMPORARY IMPACT ATTENUATOR FOR SHOULDER, CAPABLE OF REDIRECTION REMOVE AND RESET**	**EACH**
ITEM 853.44	**TEMPORARY IMPACT ATTENUATOR FOR MEDIAN, CAPABLE OF REDIRECTION**	**EACH**

The work under these items shall conform to the relevant provisions of Section 850 and supplemented as follows:

The Temporary Impact Attenuator shall be designed and constructed in accordance with applicable AASHTO requirements for a design speed of 40 mph. The width of the Temporary Impact Attenuator shall be equivalent to temporary precast median barriers to be used under this project. Only those Temporary Impact Attenuators that are included in the latest "Approved Equipment List" will be used for this project.

All shop drawings and calculations for the Temporary Impact Attenuator shall be submitted to the Engineer for his approval prior to installation.

MEASUREMENT AND PAYMENT

The quantity of Items 853.42, 853.421 and 853.44 will be measured for payment as specified in Standard Specifications for Highways and Bridges by the count of each. Work under these items will be paid at Contract Bid Unit Prices of these items per EACH in full compensation for all labor, materials, transportation, equipment and expertise required to complete the work, including all incidentals.

ITEM 874. STREET NAME SIGN EACH

The work to be done under this Item shall conform to the relevant provisions of Section 828 amended and/or supplemented as follows:

Under this Item the Contractor will supply Street Name Signs where shown on the pavement marking plan and as detailed on the Sign Summary Plan.

Legend shall be series C. Signs shall have legends on both sides.

Also included under this Item are all hardware, brackets, bolts, etc., necessary to attach the panels to P5 posts. Sign Supports (steel) will be supplied for under Item 847.1.

The quantity of Items 874. STREET NAME SIGN will be measured for payment as specified in Standard Specifications for Highways and Bridges by the count of each. Work under this item will be paid at Contract Bid Unit Prices per EACH in full compensation for all labor, materials, transportation and equipment required to complete the work, including all incidentals.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work shall consist of removing and resetting existing traffic signs and posts in accordance with the relevant provisions of Sections 828 and 840, and the following:

The work includes all miscellaneous signs designated to be removed and reset and includes the dismantling, removal, transporting and resetting of the existing signs and posts at the locations indicated on the plans.

The existing sign posts are to be used if in good condition. Posts that are not usable as determined by the Engineer shall be disposed of by the Contractor and new supports shall be furnished.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match the existing conditions of adjacent areas.

Payment for new supports, if required, for signs to be removed and reset shall be included under Item 847.1.

The existing signs and posts shall not be removed and reset until directed by the Engineer.

MEASUREMENT AND PAYMENT

Item 874.2 shall be measured and paid for at the contract price EACH which includes full compensation for all labor, materials, and equipment required to complete the work, including dismantling, excavation and removal, loading, transporting and resetting of the signs as designated above, the removal and disposal of their supports and gravel backfill, and all incidentals.

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED EACH

Work under this Item includes the dismantling, removal, disposal, transporting and stacking of existing warning, regulatory, guide signs, delineators, street name signs, miscellaneous signs and their supports The Contractor shall transport the signs to a storage yard within the District.

The work shall also include removing the supports, excavation of the existing foundations to a depth of at least 150 millimeters below the existing ground, disposing of the concrete, backfilling with compacted gravel and the restoration or replacement in kind of the areas resulting from the excavation.

MEASUREMENT AND PAYMENT

Item 874.4 shall be measured and paid for at the contract price EACH which includes full compensation for all labor, materials, and equipment required to complete the work, including dismantling, excavation and removal, loading, transporting of the signs as designated above, the removal and disposal of their supports and gravel backfill, and all incidentals.

ITEM 945.103 DRILLED SHAFT EXCAVATION 1.22 METER DIAMETER METER
ITEM 945.203 ROCK SOCKET EXCAVATION 1.22 METER DIAMETER METER
ITEM 945.503 DRILLED SHAFT 1.22 METER DIAMETER METER

The work under these items shall conform to the provisions of Section 945 of the Supplemental Specifications to the 1995 Standard Specifications for Highways and Bridges, and the following:

The diameter of the drilled shaft shall be 1.22 meters.

The Drilled Shaft Installation Plan shall also be submitted to the MBTA Railroad at least 30 days prior to the anticipated date of beginning drilled shaft work for review and approval.

ITEM 949. PREDRILLING FOR PILES METER

The work under this Item shall conform to the relevant provisions of Section 940 and the relevant provisions of Section 945 and the following.

The Contractor shall use drilling techniques that are technically adequate to meet the geological conditions encountered at the site. Predrilling shall be performed such that the sidewalls of the hole are stable at all times. Holes shall be 450 mm in diameter and shall extend a minimum of 4.5 meters below the finished top of pile elevation. Holes shall be drilled to the dimensions and depth indicated in these Special Provisions or as directed. If a pile is located within the pile length of one of the historic houses the depth of the hole shall be increased to 10 meters below the finished top of pile elevation. Materials removed from the holes and slurry shall be disposed of according to the applicable federal, state and local regulations and shall not be discharged into any stream, waterway, or storm water drainage system.

If approved by the Engineer, a partially drilled hole may be left open overnight, provided that the hole is stabilized at the bottom, sides and surface to prevent soil caving or swelling or a reduction of soil strength, and is covered at the surface to protect the public. Predrilling for piles shall be accomplished with conventional tools such as earth augers, casing twisters, and drilling buckets attached to drilling equipment of the size, power, torque, and down thrust (crowd) approved for use by the Engineer.

Should the Engineer have reason to believe that the drilling techniques or workmanship have been deficient and that the integrity of any hole is in question, work on that hole shall be stopped. Drilling will not be allowed to resume until the deficient techniques or workmanship have been changed to the satisfaction of the Engineer.

OBSTRUCTION - The work to be done under this section shall conform to the relevant provisions of Section 940 of the Standard Specifications.

BACKFILLING - Upon installation of pile, the predrilled hole shall be filled with sand borrow. Sand borrow shall conform to the requirements of Section M1.04.0 Type a.

MEASUREMENT AND PAYMENT

Predrilling for Piles shall be measured and paid at the Contract Bid Unit Price per METER to the nearest 1/10 meter, in full compensation for all labor, materials, hardware, tools, transportation, drilling equipment and expertise required to complete the work of drilling the holes for piles and filling the holes upon installation of the piles. The Contract Bid Unit Prices shall also include temporary casing, water control, removal from the site and disposal of excavated materials, and all incidentals. If holes larger than the diameter specified on the plans are made at the Contractor's option, no additional compensation will be provided to drill oversized holes.

ITEM 950.3 TEMPORARY STEEL SHEETING LUMP SUM

The work to be done under this Item shall conform to the applicable provisions of Sections 140 and 950 of the Standard Specifications, amended as follows:

The Contractor shall furnish, install, maintain, relocate if necessary, and remove temporary steel sheeting as required, based upon the actual site conditions, to allow the safe staged removal of the existing structure, staged construction of the proposed structure and construction of the temporary pedestrian bridge approaches. Sheeting shall also prevent damage to, or undermining of, the sides of excavations, roadways, and portions of existing structures to remain or be maintained.

The sheeting shall be installed to provide sufficient space to allow for the installation of the temporary traffic barrier system and the required lane widths specified during stage construction. Construction shall be as such to permit excavation required. Interior dimensions shall be such as to give sufficient clearance for construction forms and their inspection. The approximate layout of the temporary steel sheeting is shown on the Plans. The temporary steel sheeting shall be installed over the limits that will allow for a 2.0H:1.0V excavation slope beyond the bottom of excavation with an allowance for a 300 mm depth of over-excavation.

Steel sheeting shall conform to ASTM A328/A328-93. Foreign source of supply may be submitted for approval if sufficient documentation is provided demonstrating that domestic material is unavailable and that ASTM A328/A328-93 compatibility is achieved.

The temporary steel sheeting at locations shown on the plans shall be fully designed by the Contractor to carry all the applicable AASHTO loads. It shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 1995, and all interims published as of the bid opening date.

The Contractor shall make his/her own evaluation of existing site conditions and facilities, and shall design and construct the proposed temporary steel sheeting to be compatible with the Contractor's means and methods of construction including bridge demolition, bridge excavation and bridge construction.

ITEM 950.3 (Continued):

The Contractor is responsible for determining all geotechnical criteria associated with the temporary steel sheeting and provide a design considering all of the applicable AASHTO loads, including, but not limited to, lateral earth pressures, live load surcharge due to MS22.5 truck loading, impact to temporary concrete barriers, surcharge due to construction equipment operation and/or surcharge due to material storage near the top of excavation. The design shall provide for all anticipated load conditions that may occur during the entire construction period.

Maximum design stresses in steel members shall not exceed 125% of the allowable basic stresses specified in the current specifications of the American Institute of Steel Construction. The minimum factor of safety for each of the design conditions shall be 1.50. Temporary earth support system shall be designed in accordance with the AASHTO Guide Design Specifications for Bridge Temporary Works, 1995, and all interims published as of the bid opening date.

The temporary steel sheeting must be designed and stamped by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. Complete detailed drawings and calculations shall be submitted to the Engineer for approval. Written approval must be obtained prior to installation of temporary steel sheeting. Furnishing such plans and calculations shall not relieve the Contractor of sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful project completion. Any work adjacent to the tracks shall meet all the requirements of the Railroad Specifications and shall not commence until approval from the Engineer and Railroad has been received.

MEASUREMENT AND PAYMENT

The Item 950.3 TEMPORARY STEEL SHEETING is a lump sum item consisting of furnishing, installing and removing temporary steel sheeting including furnishing design and plans, as specified above. Work under the item will be paid at Contract Bid Unit Price per LUMP SUM in full compensation for all labor, transportation, materials, anchors, whalers and braces, equipment and expertise required to complete the work, to be paid with the following breakdown:

- Sixty percent (60%) of the Lump Sum price will be paid for complete installation,
- Forty percent (40%) upon complete removal and acceptance of the completed project by the Engineer.

All payments are subject to retainage.

ITEM 993.21 TEMPORARY PEDESTRIAN BRIDGE LUMP SUM

The work under this item shall conform to the relevant provisions of Section 995, and with the specific requirements stipulated below for component parts of the subject items. Where no specific requirement is directed for a component part of the construction of Item 993.21, the Standard Specifications shall apply, except for payment.

The work under this item consists of the construction of a temporary pedestrian bridge across the railroad right-of-way in accordance with the Plans and these Specifications. The work includes, but is not limited to, construction, maintenance and subsequent removal of a temporary bridge and all excavation and backfill necessary for the completion of the work. It shall also include all cement concrete for the temporary abutments, temporary pier footings and bridge deck, steel reinforcement, temporary sidewalk connections and grading of approach ramps to existing sidewalks, completely enclosed protective screen and all items included hereinafter under Basis for Partial Payments.

All materials shall be new and shall conform to the relevant provisions of the Standard Specifications and these Special Provisions. Protective screen shall be in continuous lines. The structure shall be provided with temporary signs adequate to give warning and direction to the public. The temporary pedestrian bridge construction and demolition shall not reduce the railroad clearance envelope over the MBTA tracks.

The Contractor shall coordinate his activities with the MBTA Railroad in accordance with the relevant provisions of the railroad special provisions and the following:

The Contractor shall prepare and submit to the Engineer and Railroad, for approval, a plan indicating his/her proposed temporary pedestrian bridge erection procedure and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, etc… The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61D, Erection, of the Standard Specifications for Highway Bridges and the Supplemental Specifications. The erection procedure and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. Work under this item may not commence until the Engineer and Railroad have given written approval of the method of erection of the temporary pedestrian bridge.

ITEM 993.21 (Continued):

Demolition of the existing bridge shall not begin until the temporary pedestrian bridge is complete and accepted by the Engineer.

Maintenance of the structure shall be the Contractor's responsibility for the entire period of use. It shall include required repairs when the work on permanent construction has been temporarily suspended and shall also include snow removal.

After the permanent highway bridge is open for safe pedestrian travel as approved by the Engineer, the temporary pedestrian bridge and its approaches shall be removed to the limits stated in the Plans and the site shall be restored as far as practicable to its original condition.

DEMOLITION OF TEMPORARY PEDESTRIAN BRIDGE SUPERSTRUCTURE

The work under this heading shall conform to the relevant provisions of Section 112 and Section 960 of the Standard Specifications and shall include the demolition, removal and satisfactory disposal of all materials making up the temporary pedestrian bridge superstructure as directed.

The Contractor shall coordinate his activities with the Railroad in accordance with the relevant provisions of the railroad special provisions and the following:

The Contractor shall prepare and submit to the Engineer and Railroad, for approval, a plan indicating his/her proposed demolition procedures and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, details of temporary protective shielding, etc… The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61D, Erection, of the Standard Specifications for Highway Bridges and the Supplemental Specifications. The demolition procedure and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. Work under this item may not commence until the Engineer and Railroad have given written approval of the method of demolition.

ITEM 993.21 (Continued):

REINFORCED CONCRETE EXCAVATION

The work under this heading shall conform to the relevant provisions of Section 112 of the Standard Specifications and shall include the demolition and disposal of the temporary pedestrian bridge concrete abutments and pier footings to the extents shown on the Plans or as directed by the Engineer. All necessary earth excavation to accomplish the partial demolition of the substructure shall be considered incidental to Bridge Excavation.

All concrete removed under this item shall become the property of the Contractor and shall be disposed of by him away from the work site.

The Contractor shall take all measures necessary to prevent any debris resulting from demolition or equipment from falling onto the railroad or its property. Any material or equipment that accidentally falls onto railroad property shall be removed immediately at the Contractor's expense.

Any work adjacent to the tracks shall meet all the requirements of the Railroad Specifications and shall not commence until approval from the Engineer and Railroad has been received.

BRIDGE EXCAVATION

The work under this heading shall conform to the relevant provisions of Section 140 of the Standard Specifications and shall include all excavation necessary to construct the temporary pedestrian bridge and all excavation necessary to demolish the temporary pedestrian bridge.

30 MPa-40 mm-335 kg CEMENT CONCRETE
30 MPa-20 mm-390 kg CEMENT CONCRETE

The work to be done under these headings shall conform to the relevant provisions of Section 901, supplemented and amended as follows:

The 30 MPa-40 mm-335 kg cement concrete shall be used to construct the temporary pedestrian bridge deck slab and temporary abutment backwall.

ITEM 993.21 (Continued):

The 30 MPa-20 mm-390 kg cement concrete shall be used to construct the temporary abutment footings, stems and backwalls and the pier footings.

All concrete shall be placed in the dry. The seat elevations shown on the Plans shall be verified by the Contractor prior to forming the concrete.

Included in the work are the furnishing and installing of preformed fillers and other items incidental to the furnishing and placing of concrete. All other work covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the contract shall be considered as included in the unit price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer, in the respective "Basis for Partial Payment".

STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

The work under this heading shall conform to relevant provisions of Section 901 and as follows:

All steel reinforcement shall be coated. Reinforcing lap lengths shall be as indicated on the plans.

FULLY ENCLOSED PROTECTIVE SCREEN

The work under this heading shall conform to relevant provisions of Section 975 and as follows:

The protective screen shall provide a fully enclosed screen as detailed on the Plans. The Contractor shall submit shop drawings of the screen for approval by the Engineer.

ITEM 993.21 (Continued):

MEASUREMENT AND PAYMENT

Within ten (10) days after the award of the Contract, the Contractor shall submit, in duplicate, for the approval of the Engineer, a schedule of unit prices for the major components of the temporary pedestrian bridge as a "BASIS FOR PARTIAL PAYMENTS" as listed below. The temporary pedestrian bridge Lump Sum breakdown quantities provided below are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 993.1 and no further compensation will be allowed.

BASIS FOR PARTIAL PAYMENTS

Sub-Item	Description	Quantity	Unit	Unit Price	Total
114.11	Demolition of Temporary Pedestrian Bridge Superstructure	1	LS		
127.1	Reinforced Concrete Excavation	9	CM		
140.	Bridge Excavation	70	CM		
151.1	Gravel Borrow for Bridge Foundation	10	CM		
151.2	Gravel Borrow for Backfilling Structures and Pipes	9	CM		
901.	30 MPa-40 mm-335 kg Cement Concrete	22	CM		
904.	30 MPa-20 mm-390 kg Cement Concrete	22	CM		
910.1	Steel Reinforcement for Structures – Epoxy Coated	3500	KG		
933.	Elastomeric Bridge Bearing Pad	4	EA		
960.	Structural Steel	24800	KG		
975.31	Fully Enclosed Protective Screen	60	M		
	Total Cost of Item 993.21 =				

The above schedule applies only to the Temporary Pedestrian Bridge. Payment for similar materials and construction at locations other than at the temporary pedestrian bridge shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassHighway Standard Nomenclature.

ITEM 994.01 TEMPORARY PROTECTIVE SHIELDING LUMP SUM
BRIDGE NO. I-01-007

The work under this Item shall consist of designing, furnishing, erecting, maintaining, removing, and disposing of temporary protective shielding to protect MBTA Railroad property from falling debris during bridge demolition and construction.

Prior to the start of demolition, the Contractor shall be required to submit the details of the temporary shielding to the Engineer and MBTA Railroad for review and approval. The protection shielding shall be designed by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. The drawings and calculations, submitted to the Engineer, shall bear the seal of the Professional Structural Engineer in charge of the design. Written approval must be obtained prior to erection of the protective shielding.

The shielding shall be designed to safely withstand all loads that it will be subjected to. The allowable design stresses shall be in accordance with AASHTO Standard Specifications for Highway Bridges. The design of the shielding for deck removal shall also include a complete description of the equipment and construction methods proposed for the deck removal and also the maximum size of deck area being excavated. The shielding shall also be designed to withstand the maximum size of deck area excavated should it fall inadvertently.

The shielding shall extend the full length of the bridge span and a sufficient distance above and beyond the deck overhang at the fascia to protect the railroad below. All spaces along the perimeter of the shielding and at the seams shall be sealed to prevent dust and debris from escaping and falling onto the MBTA railroad below.

The shielding shall not reduce the existing railroad clearances in the span over the MBTA tracks. The installation and removal of shielding will require coordination with the Railroad to ensure that any shielding system used meets their safety requirements.

The shielding shall be maintained and remain in place until the deck demolition is complete. Shielding shall be removed only upon approval of the Engineer. After completion, the shielding shall be removed and disposed of properly. All materials used in the shielding system shall be property of the Contractor and shall be completely removed from the site at the completion of the project.

Under Item 994.01 of the Contract, the Contractor will be paid the Contract Lump Sum price for Temporary Protective Shielding, which price shall include full compensation for the design of the shielding scheme, all equipment, materials, tools and labor necessary for the installation, maintenance, operation, removal and disposal of the protective shielding. Payment of 75% of the Lump Sum Bid Price of this Item will be paid upon complete installation and approval by the Engineer. The remaining 25% of the Lump Sum Bid Price of this Item will be paid following complete removal and disposal of the shielding from the project.

ITEM 995.01 BRIDGE STRUCTURE, BRIDGE NO. I-01-007 LUMP SUM

The work under this Item shall conform to the applicable provisions of Section 995 of the Standard Specifications and the specific requirements stipulated below for component parts of this item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

The Contractor shall prepare and submit to the Engineer and Railroad, for approval, a plan indicating his/her proposed bridge erection procedure and methods to be used including equipment, tools, devices, crane capacity and location, schedule of operations, etc… The requirements for equipment and all procedures utilized shall be in conformance with the intent of Subsection 960.61D, Erection, of the Standard Specifications for Highway Bridges and the Supplemental Specifications. The erection procedure and any necessary calculations and drawings shall be stamped by a Professional Structural Engineer registered in the Commonwealth of Massachusetts. Work under this item may not commence until the Engineer and Railroad have given written approval of the method of erection of the bridge.

The work under this Item shall include all materials, equipment and labor needed to construct the following: abutments, approach slabs, wingwalls, retaining walls, piers, crash walls, highway guardrail transitions, concrete deck slab, sidewalks and bridge railings, all 30 MPa-40 mm-335 kg cement concrete, all 30 MPa-20 mm-390 kg cement concrete, all 35 MPa-20 mm-405 kg HP cement concrete, all 30 MPa-30 MM-347 kg HP cement concrete, the reinforcement for all these concretes, mechanical reinforcing bar splicers, structural steel, bearings, and all items included hereinafter under Basis for Partial Payments.

The work does not include any item listed separately in the Proposal. Payment for materials shown on the Plans as being part of this bridge structure or which may be incidental to its constructions and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price for the component of which they are part.

ITEM 995.01 (Continued):

30 MPa-40 mm-335 kg CEMENT CONCRETE
30 MPa-20 mm-390 kg CEMENT CONCRETE
35 MPa-20 mm-405 kg HP CEMENT CONCRETE
30 MPa-20 mm-347 kg HP CEMENT CONCRETE
ITEM 995.01 (Cont'd)

The work under these headings shall conform to the relevant provisions of Section 901, supplemented and amended as follows:

All concrete shall be placed in the dry.

The various classes of concrete shall be used as specified on the Plans, and generally described as follows:

30 MPa-40 mm-335 kg cement concrete shall be used to construct the abutment stems and footings, approach slabs, grade beam, railroad crash wall, wingwall stems, retaining wall stems and footings, and highway guardrail transition bases.

30 MPa-20 mm-390 kg cement concrete shall be used to construct the abutment backwalls and curtain walls, pier caps and pier columns.

35 MPa-20 mm-405 kg HP cement concrete shall be used to construct the sidewalks, CP-PL2 barriers and the highway guardrail transitions and as shown on the plans.

30 MPa-20 mm-347 kg HP cement concrete shall be used to construct the bridge deck and abutment end diaphragm.

Included in the work are the furnishing and installing of preformed fillers and other items incidental to the furnishing and placing of concrete. All other work covered in the Schedule of Basis for Partial Payments or for which payment is not provided elsewhere in the contract shall be considered as included in the unit price per cubic meter of concrete, as stated by the Contractor and approved by the Engineer, in the respective "Basis for Partial Payment".

ITEM 995.01 (Continued):

FORM LINERS

Wing walls and abutments, as shown on the plans, shall be poured with form liners providing a pattern that shall accurately simulate the appearance of natural cut stone masonry.

SUBMITTALS

Prior to commencing this work, the Contractor shall submit the following items for approval:

Form liner pattern samples, manufacturer's recommendations and instructions, as well as color staining samples.

Name of the manufacturer and samples of all anti-graffiti materials, including manufacturer's product description and instructions.

A work plan of procedures for:

- preparation and placement of forms to achieve natural stone face as shown in the drawings;
- placement of concrete removal of forms;
- patching and grinding of poured concrete surface to achieve natural stone appearance;
- preparation of concrete surfaces for stain application;
- application of stain;
- application of anti-graffiti coating all necessary worker and environmental protection;
- any other procedures determined necessary to complete the work.

All procedures must be approved by both the Research and Materials Division and Bridge Section of the MHD prior to implementation.

ITEM 995.01 (Continued):

SHOP DRAWINGS

The Contractor shall provide detail drawings with elevations, sections, and details that show overall pattern, joint locations, end and edge, and other special conditions of all wall surfaces, which are to receive an architectural finish, as required to provide an overall uniform appearance and effect of a stone masonry wall. The form liner panel sizes and layout shall be shown on the elevations and shall be coordinated with the wall geometry and construction joint and expansion joint layout for the abutments and wingwalls. The wall elevation views and form liner details shall be submitted to the Engineer for review and approval.

TEST PANEL

The Contractor shall construct on site, sixty days before work starts, a sample Test Panel using the same materials, methods, and work force that will be used for the project. Size of the sample panel shall be five (5) square meters or larger, if needed to adequately illustrate the pattern and texture selected. Minimum thickness of the concrete panel for the Test Panel shall be 100 mm.

The approved Test Panel shall serve as the quality standard for the project. The test panel shall provide, as a minimum, a representation of the following:

- The texture and general appearance of the form liner panels;
- Staining colors and technique of combination to achieve appearance of natural stone
- Methods of anti-graffiti coating application, demonstrating the work crew's expertise;
- Worker and environmental safety practices to be used during construction;
- Methods that would be used to repair typical concrete defects and/or damage such as, but not limited to, blemishes from foreign material, honeycombing, chips, and form tie rod holes;
- Methods that would be used to repair any defects caused in conjunction with the use of the anti-graffiti coating;

The Test Panel shall be constructed in the same manner and schedule as the in-situ work. The Contractor shall not purchase materials or proceed with the construction of the proposed cast-in-place cement concrete work, without the approval of the Test Panel by the Engineer.

ITEM 995.01 (Continued):

Any changes of the mix design, cement manufacturer, aggregate sources, and procedures used to fabricate the approved test panel proposed during construction will require the construction and approval of another Test Panel. ‘

After concrete work on Test Panel is completed and cured for a minimum of 28 days, and after surface is determined to be acceptable for coloring, apply color stain system.

After coloring is determined to be acceptable by the Engineer, construction of the project may proceed, using the Test Panel as the quality standard.

MATERIALS

Form liners shall be reusable, made of high-strength elastomeric urethane, and easily attachable to forms. Molds shall be cast from real stone. Molds shall not compress more than 6 millimeters when concrete is poured at the rate of 3 vertical meters per hour. Molds shall be removable without causing deterioration of surface of underlying concrete.

Form liners shall be cast from real stone, not from clay liners or other methods. Stone pattern shall be rectangular cut stone, with average relief of 50mm (2 inches). Form liners pattern shall be a random cut stone pattern with a 300mm (12”) coursing, as provided by Concrete Rock Surfaces, LLC, Bethel, CT (203) 743-3693; or Custom Rock Form Liner in St. Paul, MN (1-800-637-2447); or approved equal.

Form ties shall be metal or fiberglass, and shall be designed such that any portion remaining in the poured concrete will be sufficiently embedded that it may be patched over.

The coating on the form liner and the formwork shall be compatible with the color stain and shall be cleaned before staining

Anti-graffiti coating. The anti-graffiti coating shall be a clear, non-yellowing, chemical and scratch resistant, fast curing, water-based, one-component silicone elastomer specifically formulated to protect surfaces subject to repeated graffiti attacks. It shall have no effect on the color of the concrete.

Release agent used for forms shall be compatible with masonry molds and color stain material to be used.

ITEM 995.01 (Continued):

Color Stain: Special penetrating stain mixes, as provided by a manufacturer, shall achieve color variations present in the natural stones being simulated for this project. It may be necessary to use multiple applications of many different color pigments to achieve desired coloration. The stain shall create a surface finish that is breathable (allowing water vapor transmission) and resists deterioration from water, acid, alkali, fungi, sunlight, or weathering. Stain mixes shall be a water borne, low V.O.C. material, less than 289 grams/liter, and shall meet requirements for weathering resistance of 2,000 hours of accelerated exposure, measured by weather-o-meter in accordance with ASTM G 23. Scrub test shall be 1,000 revolutions. Abrasive resistance (Tabor-CF-10) shall be 500 cycles. Adhesion shall be tested in accordance with ASTM D 3359, Test Method B, 1.00 mm cross-cuts on glass, with 3 or higher for passing on a scale of 0 to 5. Supply information pertaining to chemical resistance in accordance with ASTM D 1308.

CONSTRUCTION METHODS

Acceptable installer of formed concrete construction shall have five years experience pouring vertically formed architectural concrete. Installer shall be trained in the manufacturer's special techniques in order to achieve realistic textured surfaces.

Form liner manufacturer representative shall be present for critical decisions on procedures: cost of representative, if any, shall be incidental to this Item.

Prior to construction of samples, schedule a conference with manufacturer’s representative to ensure proper understanding and application of stone masonry molds, finishing, color application, and all necessary procedures to complete the work.

Form liners shall be used according to the manufacturer's written instructions and recommendations. Approved manufacturer’s authorized representatives shall provide additional job site training in the proper use of the form liners.

The form liner pattern shall meet the requirements of the parameters of the stone pattern and the limits of the panels as shown on the plans and specified herein. The panels have been laid out so that construction joints and expansion joints are achieved at the vertical delineations between panels, rather than on the patterns.

ITEM 995.01 (Continued):

The form liner panels shall be laid out so that the top of a wall starts with a full panel. Seam lines or match lines caused from two or more molds coming together will not be apparent when viewing the final wall condition. Match the texture and shape of the surrounding stone, avoiding visible seams or mold marks by patching with patching material, grinding of grout joints, or bush hammering to remove form liner lines.

Strict placing, vibrating, and form stripping practices shall be followed to achieve quality concrete and an unblemished surface.

Any surface voids, forming accessory holes, discoloration, pockmarks, or other blemishes shall be corrected by patched and ground smooth as required to achieve the desired surface. Flat surfaces shall be smooth, form-lined surfaces shall have a natural finish corresponding to the mold.

All flat surfaces, including, but not limited to, chamfers, frame surfaces, joints, fascia, and railings shall be hand rubbed to achieve a sanded finish. The Contractor shall repair any concrete damage or defects prior to preparing the concrete for hand rubbed finish. These repair methods shall be consistent with those used on the Test Panel. All surfaces to be treated shall be structurally sound, clean, dry, fully cured and free from dust, laitance, curing or form release agents, oil, grease, efflorescence, scale, or other foreign materials.

Sand blasting shall not be used for surface preparation or cleaning. Pressure washing is recommended.

All surfaces to be treated with anti-graffiti shall be prepared per manufacturer’s requirements. Two coats of anti-graffiti coating shall be applied by airless spray, brush, or roller. All manufacturer's recommendations and procedures shall be strictly adhered to. Approved manufacturer’s authorized representatives shall provide additional job site training in the proper mixing and application procedures of the anti-graffiti coating. The cost for sufficient involvement of the authorized representatives in the construction of the Test Panel and the in-situ walls shall be considered incidental. All State, Federal and local safety and environmental protection requirements shall be strictly adhered to.

The final application of an anti-graffiti coating on the exposed concrete surfaces shall end at a point no less than 450 millimeters below the finished grade or as directed by the Engineer.

ITEM 995.01 (Continued):

Stain application shall be by manufacturer or authorized representative. All form lined surfaces shall be stained. No staining activities shall occur until shall occur until patched areas are at least 30 days old. All surfaces shall be cleaned and free of latency, dirt, dust, grease, efflorescence, paint, or other foreign material. Color staining shall use a blend of several colors to achieve a natural stone appearance. Test panel shall be used to determine appropriate coloring, and this shall serve as a reference of the walls.

Cost of form liners and all necessary work to produce the desired finish shall be considered incidental to the concrete item to which the form liner is being applied. No additional compensation will be provided for the forms, treatment of surfaces or cleaning.

30 MPa-20 mm-347 kg HP Cement Concrete

The work to be done under this heading shall conform to the relevant provisions of Subsection 901 of the Supplemental Specifications and the following:

30 MPa-20 mm-347 kg HP Cement Concrete shall be used to construct the deck slab and at those areas designated by the Engineer, and/or as designated on the Plans.

At least 30 calendars days prior to the proposed start of placing the concrete bridge deck, the Contractor shall submit to the Engineer for approval, a submission (herein called the Placement and Curing Plan) specifying the method of concrete conveyance, placement, type and number of finishing machines and work bridges, rate of pour, estimated time of completion, screed and rail erection plan, sequence of concrete pours, and the concrete curing procedure. The Placement and Curing Plan shall take into consideration weather conditions. It shall also include details and a complete description of equipment to be used in the handling, placement, finishing and curing the concrete including the number and type of personnel who will be engaged in the operation. The personnel shall consist exclusively of persons with the experience and skill appropriate to their working assignment. Approval of this plan will not relieve the Contractor of the responsibility for the satisfactory performance of his/her methods and equipment.

ITEM 995.01 (Continued):

The Placement and Curing Plan shall include, but not be limited to, the following:

1. Proof of the following minimum operator qualifications for the bridge deck finishing machines(s):
   a. Five years experience operating machines of similar type and manufacturing as that proposed.
   b. Proof of no less than five bridge decks of similar size, placed using a machine of the same manufacturer as that proposed.

   Or, as a substitute for a. and b.:

   c. A representative of the manufacturer of the bridge deck finishing machine shall be present on the site a minimum of 24 hours in advance of the proposed deck placement to approve the set up of the machine and rail system, and the representative shall be present for the entire duration of the placement of the deck concrete using the bridge deck finishing machine.
2. Provisions for the consolidation of cement concrete. At least one vibrator shall be in service per each 23 cubic meters per hour (30 cubic yards per hour) of cement concrete placed with at least 2 vibrators in service at all times.
3. Curing method. At least two workers shall continuously place wet burlap curing materials from a dedicated work bridge from the start of the deck placement until the deck is completely covered with wet burlap.
4. When cold weather is reasonably expected during the 14 day wet curing period, or has occurred within 7 days of anticipated concrete placement, the Contractor shall include detailed procedures for the production, transporting, placing, provisions for enclosures, protecting, curing, and temperature monitoring of concrete during cold weather, including a plan of heating devices, types and locations around structure.
5. Method of monitoring temperature of hardened concrete. The method of monitoring concrete temperatures shall be submitted regardless of whether cold weather is expected during the 14 day wet cure period.
6. Letter certifying that the fogging equipment attached to the finishing machine produces atomized water droplets with an average droplet diameter of 0.08 millimeters (0.003 inches) or less that are uniformly distributed at a rate of at least 4.1 liters/square meters/hour (0.10 gallons/square foot/hour).
7. Backup systems as required.

ITEM 995.01 (Continued):

Before concrete placement operations begin, the Contractor shall make all necessary arrangements and have all materials on hand for curing and protecting the concrete deck. Concrete placement shall not proceed until the Engineer is satisfied that all necessary steps have been taken to insure adequate compliance with these Specifications and that completion of the operation can be accomplished within the required scheduled time. It shall be the Contractor's responsibility to allow sufficient time to permit such an inspection by the Engineer.

A pre-placement meeting shall be held between the Contractor and the Engineer at least 2 weeks prior to the start of any concrete placement for the deck slab. The Contractor and the Engineer shall review all aspects of the proposed deck slab concrete placement, as documented in the approved Placement and Curing Plan, including, but not limited to, the following:

- Equipment proposed for use and for back-up;
- Planned workforce and assigned tasks of each designated position, based on experience and expertise;
- Proposed construction techniques;
- Safety considerations;
- Concrete mix design;
- Admixtures and performance data; dosage rates shall be as approved;
- Proposed placement rate, provisions for adverse weather, curing and loading schedules;
- Curing Practices to be employed as well as the workforce designated to the curing process;
- Delivery/conveyance equipment, including deck finishing machine setup and operation;
- Traffic control.

No concrete shall be placed until the Engineer approves all aspects of the proposed placement. Modifications must be submitted in writing to the Engineer for approval. No concrete shall be placed until the environmental conditions are deemed favorable and satisfactory means to mitigate adverse environmental conditions exist. Favorable environmental conditions are defined as an expected weather forecast suitable for concrete placement during the entire placement duration with an evaporation rate not to exceed 0.73 $kg/m^2/hr$ (0.15 $lbs./ft^2/hr$), or suitable equipment and appropriate actions are taken, as approved by the Engineer, to limit the evaporation rate of the exposed concrete surface to less than 0.73 $kg/m^2/hr$ (0.15 $lb/ft^2/hr$) and acceptable curing temperatures are expected for the duration of the curing period.

ITEM 995.01 (Continued):

The Contractor shall provide any necessary means to mitigate adverse weather conditions and curing temperatures with the approval of the Engineer. Failure to maintain acceptable environmental conditions will result in the concrete placement being stopped and a bulkhead put in place. Concrete temperature will be taken from the same sample used for slump and air content tests. These measurements will be taken prior to commencement of concrete placement. If, in the Engineer's opinion, significant changes occur in atmospheric conditions, additional atmospheric measurements and calculations by the Contractor will be required. The Contractor will supply all instruments necessary to make the required calculations, will perform the tests in the presence of the Engineer, and will document the results on the attached "Bridge Deck Placement Environment" table which shall be given to the Engineer for approval and incorporation in the contract documents files.

A trial placement of at least 2.3 cubic meters (3 cubic yards) using the approved Cement Concrete mix design shall be required a minimum of two weeks before the intended date of the deck slab placement. The Contractor will be required to demonstrate proper mix design, batching, placement, finishing and curing of the Cement Concrete deck slab. The trial placement shall simulate the actual job conditions in all respects including plant conditions, transit equipment, travel conditions, admixtures, forming, placement equipment, and personnel. If there are problems, the Engineer may require the Contractor to conduct more trial batches and trial placements. Removal of the trial placement concrete from the job site is the responsibility of the Contractor.

In addition to the requirements contained herein, all weather and concrete temperature requirements contained in Subsection 901.64 shall be satisfied. Cement concrete for bridge decks shall not be placed when the ambient air temperature exceeds 29.4°C (85°F) or is expected to exceed 29.4°C (85°F) during the placement of the deck. When placing concrete, the Contractor must provide suitable equipment and take appropriate actions as approved by the Engineer to limit the evaporation rate of the exposed concrete surface to less than 0.73 kg/m^2/hr (0.15 lb/ft^2/hr). The deck surface evaporation rate shall be determined in accordance with Figure 1 of these Specifications (obtained from "Plastic Cracking of Concrete" by Delmar Bloem for the National Ready Mixed Concrete Association and published in ACI 305R-89) and all data contained in the Bridge Deck Placement Environment table below shall be determined by the Contractor and agreed upon by the Engineer prior to and after casting the bridge deck. To maintain the deck surface evaporation rate below 0.73 kg/m^2/hr (0.15 lb/ft^2/hr) the Contractor shall take one or more of the following actions:

ITEM 995.01 (Continued):

1. Misting the surface of the concrete with pressurized equipment attached to the finishing machine until the curing cover is applied. The water mist shall be distributed at a rate of at least 4.1 liters/square meters/hour (0.10 gallons/square foot/hour). For example, on a deck that is 9.1 meters (30 feet) wide, the system must be able to apply at least 37.3 liters of water per linear meter per hour (3.0 gallons of water per linear foot per hour). The fog spray must be produced from nozzles that produce an atomized fog mist that will maintain a sheen of moisture on the concrete surface without ponding. The atomized water droplets shall have an average droplet diameter of 0.08 millimeters (0.003 inches) or less. The area of coverage from each nozzle shall overlap all adjacent coverage areas by at least 305 millimeters (12 inches). Water that drips from the nozzles shall not be allowed to fall onto the concrete that is being cured.
2. Reduce the temperature of the concrete.
3. Reschedule the placement until such time as the environmental conditions are acceptable, such as at night or during early morning hours.

Bridge Deck Placement Environment						
City/Town:				Date:		
Bridge Number:				Contract Number:		
Start Station:				End Station:		
	Time Measured	Air Temp.	Relative Humidity (%)	Concrete Temp.	Wind Velocity	Evaporation Rate
Prior to Casting						
After Casting						
Signature - Contractor's Authorized Representative:				Printed Name:		
Signature – MHD Resident Engineer:				Printed Name:		

ITEM 995.01 (Continued):

CEMENT CONCRETE CRACK SEALING

Cement Concrete crack sealing requirements defined herein are for the repair and sealing of cast-in-place cement concrete to prevent water infiltration to the steel reinforcement bars. The width of cracks shall be determined by the Engineer using a width indicating comparator card made of clear plastic with lines of specified width on the cards. The crack width comparator cards shall be held on concrete surfaces to allow the widths of any concrete cracks to be determined by direct visual comparison of the crack width with the widths of the lines marked on the card surface. These cracks are assumed to be non-moving and to have been caused by inadequate control of shrinkage or temperature stresses during curing. Cracks that are of structural concern shall be repaired by other methods determined by the Engineer. All required crack sealing and crack repairs shall be performed by the Contractor without additional compensation. The Contractor shall be required to seal cracks even if the environmental conditions during placement and curing satisfied specification requirements.

Cracks shall be sealed after construction movement is substantially stable and before waterproofing, pavement, or other construction covers the cracked surface. Crack sealing material shall be applied by skilled applicators under a supervisor with proven successful experience in applications with similar scope of work. Crack sealing materials shall be applied when the concrete and the ambient air temperatures are above 4.5°C (40°F). If a heated enclosure is used to accomplish this, the heating units shall be properly vented to the outside of the enclosure to prevent products of combustion from exhausting within the enclosure.

Before containers of sealing materials are opened, the labels shall be checked and the label information shall be documented. If multi-component systems are used, mixing shall be completed prior to application. Manufacturer's instructions shall be followed. An initial crack sealing demonstration application shall be satisfactorily made in the presence of the Engineer before the application is continued.

Before sealing, the concrete must be clean, sound, and free of contaminants and surface moisture. Any curing compounds, sealers, oils, greases, coatings, or other impregnations shall be removed by abrasive blast cleaning. Once any concrete surface contaminants are removed, the concrete shall be swept clean and blown off using oil-free compressed air immediately prior to applying the sealer.

ITEM 995.01 (Continued):

Methacrylate crack sealing shall be performed in accordance with the manufacturer's instruction within the allowable ambient temperature range. The cracks shall be v-notched to a minimum depth of 12 mm (½") and shall be cleaned with oil-free compressed air. The notch shall then be inspected to confirm that the crack was intercepted. If the crack was not intercepted, the notch shall be expanded to intercept the crack and shall then be re-cleaned with oil free compressed air. Methacrylate shall then be poured into the crack. The crack shall then be observed for seepage of methacrylate and shall be refilled as necessary to ensure the crack is completely filled. If large quantities of methacrylate are used and the crack is not getting filled, the crack should be filled with pre-bagged dried silica sand filler and the crack shall then be re-filled with methacrylate.

Methacrylate crack sealer shall consist of a high molecular weight low viscosity methacrylate monomer that when catalyzed will produce a crack-healer/penetrating-sealer that is a rapid-curing, modified-methacrylate resin. The methacrylate material shall, as a minimum, provide the following as applied properties:

Property	Value	Test
Viscosity	<25 cps	ASTM D2393-86
Bond Strength	>10.3 MPa (1500 psi)	ASTM C882
Tensile Elongation	>3%	ASTM D638

In addition, the Methacrylate material shall demonstrate full penetration of concrete cracks in mock-up testing. Mock-up testing shall consist of preparing the deck surface, applying the methacrylate sealer, and removing cores to evaluate the depth and quality of methacrylate sealer penetration. Successful methacrylate penetration of the concrete cracks shall be demonstrated visually in nominal 75 mm (3 inch) deep cores that intersect crack widths in the 7 – 20 mil width range. The cores shall be sliced longitudinally, perpendicular to the crack, and examined in an AASHTO accredited laboratory using ultraviolet light in order to fluoresce the methacrylate to determine the methacrylate penetration depth (the deepest point to which the methacrylate reached) and the sealer-filled crack depth (the depth to which the crack was filled wall-to-wall). The results of mock-up testing shall be documented in a report prepared by the AASHTO accredited laboratory.

ITEM 995.01 (Continued):

Epoxy injection crack sealing shall be performed in accordance with the manufacturer's instructions within the allowable ambient temperature range. Epoxy-Resin for Cement Concrete Crack Injection shall conform to AASHTO M235, Type IV, Grade I. The cracks shall be cleaned with compressed air. Surface mounted injection ports shall then be installed over the centers of the cracks. The spacing of these ports shall be contingent upon the material and the injection equipment chosen. Socket porting shall be allowed provided that a hollow drill bit and vacuum system is used to prevent debris from entering the cracks. Surface ports shall be mounted with rapid setting epoxy material. The crack widths shall be noted during port installation. After the ports are installed, the crack surfaces shall be sealed with high modulus, 100% solids, moisture tolerant epoxy paste adhesive. This material shall be capped with fine sand before it is cured. After the capping material has cured, the cracks shall be injected with an epoxy resin compound. The injection pressure used to seal the cracks shall be based upon a number of factors including crack width, crack depth, and the epoxy material used. Injection shall be accomplished using a metered system. The system shall be equipped with a pressure gauge accurate for the pressures anticipated for this work. Injection shall start at the widest point of the crack and shall continue until the narrowest portions of the crack have been filled. Injection shall continue until refusal. If epoxy is observed at adjacent ports, the adjacent port shall be capped and injection shall continue until refusal occurs. Once refusal occurs, injection shall continue at the next wet port until refusal is reached.

Silane Crack Sealer shall consist of a clear, breathable, high-performance, 100 percent solids by weight Silane sealer for protecting new and existing concrete surfaces. It must penetrate deeply, sealing out water, chloride ions, and acids, and prevent damage from freeze/thaw cycles. Silane Crack Sealer material shall, as a minimum, provide the following as applied properties:

Property	Value	Test
Water Weight Gain at 6.1 m^2/l (250 ft^2/gal)	88 percent reduction	NCHRP 244 Series II-Cube test
Absorbed Chloride at 6.1 m^2/l (250 ft^2/gal)	89 percent reduction	NCHRP 244 Series II-Cube test
Absorbed Chloride at 6.1 m^2/l (250 ft^2/gal)	94 percent reduction	NCHRP 244 Series IV – Northern Climate

ITEM 995.01 (Continued):

The type of Cement Concrete crack sealing required shall be determined as a function of the surface type and maximum crack width as follows:

Bridge decks, either with membrane waterproofing and hot mix asphalt wearing surface or left exposed, and other non-overhead surfaces sloped less than or equal to 15%:

- Cracks less than 0.15 mm (0.006") wide shall be ignored;
- Cracks greater than or equal to 0.15 mm (0.006") wide and less than 0.30 mm (0.012") wide shall be sealed with an approved methacrylate;
- Cracks greater than or equal to 0.30 mm (0.012") wide shall be sealed using either epoxy injection or methacrylate with a sand filler.

Overhead surfaces, vertical surfaces, and non-overhead surfaces sloped greater than 15%:

- Cracks less than 0.15 mm (0.006") wide shall be ignored;
- Cracks greater than or equal to 0.15 mm (0.006") wide and less than 0.40 mm (0.016") wide shall be sealed with an approved silane sealer;
- Cracks greater than or equal to 0.40 mm (0.016") wide shall be sealed using epoxy injection.

STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

The work under this heading shall conform to relevant provisions of Section 901 and as follows:

All steel reinforcement other than the approach slab reinforcement shall be coated. Reinforcing lap lengths shall be as indicated on the plans.

MEASUREMENT AND PAYMENT

Within ten (10) days after the award of the Contract, the Contractor shall submit, in duplicate, for the approval of the Engineer, a schedule of unit prices for the major components of the temporary pedestrian bridge as a "BASIS FOR PARTIAL PAYMENTS" as listed below. The temporary pedestrian bridge Lump Sum breakdown quantities provided below are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

ITEM 995.01 (Continued):

BASIS FOR PARTIAL PAYMENTS

	Description	Quantity	Unit	Unit Price	Total
901.	30 MPa-40 mm-335 kg Cement Concrete	1435	CM		
904.	30 MPa-20 mm-390 kg Cement Concrete	187	CM		
904.3	35 MPa-20 mm-405 kg HP Cement Concrete	179	CM		
904.4	30 MPa-20 mm-347 kg HP Cement Concrete	222	CM		
910.	Steel Reinforcement for Structures	5000	KG		
910.1	Steel Reinforcement for Structures – Epoxy Coated	99500	KG		
910.4	Mechanical Reinforcing Bar Splicer	722	EA		
911.1	Shear Connectors	4100	EA		
933.	Elastomeric Bridge Bearing Pad	40	EA		
960.	Structural Steel	145000	KG		
965.	Membrane Waterproofing for Bridge Decks	700	SM		
970.	Bituminous Damp-Proofing	723	SM		
972.	Strip Seal Bridge Joint System	65	M		
975.4	Protective Screen Type II	103	M		
975.5	Aluminum Handrail	280	M		

Total Cost of Item 995.01 =

The Unit Prices quoted in the above schedule apply only to Item 995.01 BRIDGE STRUCTURE, BRIDGE NO. I-01-007 (AWG) in this Contract. The above Unit Prices shall not be applicable for payment for similar materials and construction other than at this Item of work in this Contract. Sub-Item numbering is presented for information only in coordination with MassHighway Standard Nomenclature.

END OF DOCUMENT

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